

**CRITICAL AND CREATIVE THINKING ITEMS**

**CLASS X : CHAPTER 1 : REAL NUMBERS**

**INDEX**

<b>S.No.</b>	<b>Theme of the item</b>
1.	<b>Fundamental Theorem of Arithmetic</b>
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3.	<b>Step Up Step Down</b>
4.	<b>LCM &amp; HCF</b>
5.	<b>Packaging supports</b>
6.	Food Suppliers
7.	Seating Plan
8.	<b>Indian Army</b>
9.	Origin of real number
10.	<b>Special Olympiad World Game (SOWG)</b>

## CCT PRACTICE ITEM - 01

<b>Domain:</b> Mathematical Literacy	<b>Theme:</b> Fundamental Theorem of Arithmetic	<b>Class:</b> X <b>Expected Time:</b> 15 minutes <b>Total Credit:</b> 10 points												
<b>Description of item"</b>	<b>Learning Outcome: (As per NCERT)</b>													
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 2px;">yes</td> <td style="padding: 2px;">Text</td> </tr> <tr> <td style="padding: 2px;">yes</td> <td style="padding: 2px;">Image</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">Table</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">Graph</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">Map</td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">Poem</td> </tr> </table>	yes	Text	yes	Image		Table		Graph		Map		Poem	<ul style="list-style-type: none"> <li>✓ Develop mastery of basic algebraic skills.</li> <li>✓ To develop ability to think and analyze logically.</li> <li>✓ Feel the flow of reason while solving a problem.</li> </ul>	
yes	Text													
yes	Image													
	Table													
	Graph													
	Map													
	Poem													

Sundaram joined a company for a fixed salary per month. After few months, the management felt happy with his work and multiplied his salary by some  $n$  times. This happened every few months and his salary kept getting multiplied and he reached a salary of 360 zeds. Every time the management increased the salary by a prime number of times only and his initial salary was 5 zeds.



(Image source – google)

Question: 1

**1.1**How many times management did give incentive to Sundaram?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	1

Description of Answer Key and Credits:

<p>Answers:</p> <p><b>1.1</b> Full credit: 5 times.  Nil credit: Any other responses.</p> <p>Explanation:</p> <p><b>1.1</b> Prime factorization of 360 will be <math>2^3 \times 3^2 \times 5 = 360</math>. so number of increments, he will get is 5.</p>
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**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

**1.2**What is the maximum increment he got in his salary?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

Answers:  
**1.2** Full credit: 3 Zeds  
 Nil credit: Any other responses.  
 Explanation:  
**1.2** Highest prime factor included in 360 is 3, so 3 zeds will be the highest increments which he got.

**1.3** What is the least incentive he got? What would be his salary had he got the same type of increment every time?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of answer keys and explanation:

Answers:  
**1.3** Full credit: 2 zeds and 160 zeds  
 Nil Credit: Any other responses.  
 Explanation:  
**1.3** Least prime factor involved in factorization of 360 is 2, so the least incentive he got is  

$$5 \times 2^5 = 160 \text{ zeds.}$$

2 zeds. If he got the same kind of increment in his salary which is 2 zeds then his salary would be 160 zeds

1.4 Had his first salary had been 9 zeds what would be his present Salary?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Description of Answer Key and Credits:

Answers:

1.4 Full credit: 648 zeds

Nil Credit: Any other responses.

Explanation:

1.4 If his first salary had been 9 zeds then his present salary can be calculated as

$$2^3 \times 3^2 \times 9 = 648 \text{ zeds.}$$

Nil Credit: 0 points

### CCT PRACTICE ITEM - 02

<b>Domain:</b> Mathematical Literacy	<b>Theme: What am I?</b>	<b>Class: X</b> <b>Expected Time: 15 minutes</b> <b>Total Credit: 10 points</b>												
<b>Description of item"</b>	<b>Learning Outcome: (As per NCERT)</b> <ul style="list-style-type: none"> <li>Understanding of different numbers.</li> <li>Use of constructive approach.</li> </ul>													
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yes	Text													
	Image													
Yes	Table													
	Graph													
	Map													
	Poem													

Question: 2 Look at the table given below and answer the following questions:

<b>-8</b>	<b>-.12</b>	$\sqrt{1}$	$1^8$	<b>533</b>
<b>234</b>	<b>5</b>	7.7	$ -4 $	1/1
<b>2π</b>	<b>645</b>	-.1	a	.39
$2/1$	b	$17^6$	-12	-0.1
$\sqrt{3}$	-1/2	$ 1.4 $	5.7	1/7

**2.1** What would be the any possible value of a, if a is the least number in the table?

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<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency Cluster	Number System
Overarching Idea	Rational and Irrational number
Context	Types of Numbers
Item Format	close constructed response
Cognitive Process	Analysis and Synthesis
Proficiency Level	1

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points Nil

Credit: 0 points

**Answers:**

2.1 Full credit: Open ended answer but 'a' should satisfy the condition. Nil  
Credit: Any other responses.

**Explanation:**

2.1 Least number present in the table is -12 so any number less than this will be the correct answer.

2.2 What could be the possible value of b, if b is the highest number in the table?

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<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency Cluster	Number System
Overarching Idea	Rational and Irrational number
Context	Types of Numbers
Item Format	close constructed response
Cognitive Process	Analysis and Synthesis
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

**Answers**

2.2 Full credit: Open ended answer but 'b' should satisfy the condition.

Nil Credit: Any other responses.

**Explanation:**

2.2 Highest number present in the table is  $17^6$  so any number greater than this will be the correct answer.

2.3 What are the types of numbers given in the table?

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.....  
.....

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number System
Overarching Idea	Rational and Irrational number
Context	Types of Numbers
Item Format	Short response items and close constructed response
Cognitive Process	Analysis and Synthesis
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points Nil

Credit: 0 points

**Answers:**

2.3 Full credit: positive integers, negative integers, rational numbers, irrational number, repeating rational number and unknown numbers (Real numbers). Nil Credit: Any other response.

**Explanation:**

2.3 All type of numbers are needed to be mentioned after proper analysis of table.



2.4 Which type of numbers are missing in the table?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number System
Overarching Idea	Rational and Irrational number
Context	Types of Numbers
Item Format	Short response items and close constructed response
Cognitive Process	Analysis and Synthesis
Proficiency Level	2

**Credit Pattern:**

- Full Credit: 2.5 points
- Partial Credit: 1 points Nil
- Credit: 0 points

**Answers:**

- 2.4 Full credit: Imaginary numbers, non-repeating numbers
- Nil Credit: Any other responses.

**Explanation:**

2.4 Missing types of number are needed to find out from the given table.

2.5 Replace a and b from the missing type of values?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number System
Overarching Idea	Rational and Irrational number
Context	Types of Numbers
Item Format	Short response items and close constructed response
Cognitive Process	Analysis and Synthesis

Proficiency Level	3
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**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

**2.5** Full credit: a and b can be replaced by imaginary and non-repeating non terminating numbers.

Nil credit: Any other responses.

**Explanation:**

**2.5** Any number from missing type of numbers is required to write.

## CCT PRACTICE ITEM - 03

<b>Domain:</b> Mathematical Literacy		<b>Theme:</b> Step Up Step Down	<b>Class: X</b> <b>Expected Time: 15</b> <b>minutes Total Credit: 10</b> <b>points</b>
<b>Description of item"</b>		<b>Learning Outcome: (As per NCERT)</b>	
	<b>yes</b>	Text	<ul style="list-style-type: none"> <li>➤ To acquaint students with different aspects of mathematics used in real life.</li> <li>➤ To develop interest in mathematics as a problem solving tool.</li> </ul>
	<b>Yes</b>	Image	
		Table	
		Graph	
		Map	
		Poem	

Nobita, Zian and Suzuko are playing a game. Nobita climbs 5 stairs and gets down 2 stairs in one turn. Zian goes up by 7 stairs and comes down by 2 stairs every time. Suzuko goes 10 stairs up and 3 stairs down each time. Doing this they have to reach to the nearest point of 100<sup>th</sup> stairs and they will stop once they find it impossible to go forward. (They have less number of stairs than required forward stairs).



(Image source – Google)

**3.1** Who reaches the nearest point?

- (a) Nobita
- (b) Zian
- (c) Suzuko
- (d) All together reach to the nearest point.

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Algebra
Overarching Idea	LCM & HCF

Context	Application of real numbers in real situation
Item Format	simple MCQs
Cognitive Process	Problem Solving
Proficiency Level	1

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points Nil

Credit: 0 points

Description of Answer Key and Credits:

<p>Answers:</p> <p>3.1 Full credit: Nobita.</p> <p>Nil Credit: Any other responses. Explanation:</p> <p>3.1 Nobita will reach up to 93 steps then he will go for 5 steps up and 2 steps down hence covering 96 steps. Since 100<sup>th</sup> step is final, so he will not cover more steps. Zian will reach up to 95 steps, since 100<sup>th</sup> step is final, so he will not cover more steps. Suzuko will reach up to 91 steps, since 100<sup>th</sup> step is final, so she will not cover more steps.</p>
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**3.2** How many times can they meet in between on same step?

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.....

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Algebra
Overarching Idea	LCM & HCF
Context	Application of real numbers in real situation
Item Format	Closed constructed
Cognitive Process	Problem Solving
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

Answers:
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3.2 Full credit: No, they cannot meet in between on same step.

Nil Credit: Any other responses.

Explanation:

3.2 Since,  $\text{LCM}(3, 5, 7) = 105$  step. Since, total steps are 100 steps only.

**3.3** What is the first stair where any two out of three will meet together?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Algebra
Overarching Idea	LCM & HCF
Context	Application of real numbers in real situation
Item Format	Closed constructed
Cognitive Process	Problem Solving
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

**Description of Answer Key and Credits:**

Answers:

3.3 Full credit: After 15 steps Nobita and Zian will meet for the first time. Nil

Credit: Any other responses. Explanation:

3.3 Since  $\text{LCM}(3,5)=15$  ;  $\text{LCM}(5,7)=35$  ;  $\text{LCM}(3,7)=21$ . Since, 15 is the smallest so Nobita and Zian will meet for the first time after 15 steps.

**3.4** Who takes least number of steps to reach near hundred?

(a) Nobita

(b) Zian

(c) Suzuko

(d) All of them take equal number of steps.

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Algebra
Overarching Idea	LCM & HCF
Context	Application of real numbers in real situation
Item Format	Closed constructed
Cognitive Process	Problem Solving
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

**3.4** Full credit: Suzuko will take least number of steps. Nil

Credit: Any other responses. Explanation:

3.4 Nobita will take 32 steps, Zian will take 19 steps and Suzuko will take 13 steps to reach to 96 steps, 95 steps and 91 steps respectively.

## CCT PRACTICE ITEM - 04

<b>Domain:</b> Mathematical Literacy	<b>Theme:</b> LCM & HCF	<b>Class:</b> X <b>Expected Time:</b> 15 minutes <b>Total Credit:</b> 10 points
<b>Description of item"</b>	<b>Learning Outcome: (As per NCERT)</b>	
<b>Yes</b>	Text	<ul style="list-style-type: none"> <li>❖ Employ conceptual knowledge in day to day life.</li> <li>❖ Consolidate the Mathematical knowledge and skills acquired at the upper primary stage.</li> </ul>
<b>Yes</b>	Image	
	Table	
	Graph	
	Map	
	Poem	

Question: A woman wants to organize her birthday party. She was happy on her birthday but there was a problem that she does not want to serve fast food to her guests because she is very health conscious. She has 15 apples and 40 bananas at home and decided to serve them. She want to distribute fruits among guests. She does not want to discriminate among guests so she decided to distribute equally among all. So,



(Image source – google)

4.1 How many guests she can invite?

- (a) 6
- (b) 5
- (c) 3
- (d) 4

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Quantity based problem
Overarching Idea	Use of real Number
Context	LCM & HCF
Item Format	Simple MCQ
Cognitive Process	Logical thinking

Proficiency Level	1
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**Credit Pattern:**

Full Credit: 2.5 points  
 Partial Credit: 1 points  
 Nil Credit: 0 points

Description of Answer Key and Credits:

<p>Answers:          4.1 Full credit: 5 GUESTS any other response Nil Credit.</p> <p>Explanation:          4.1 We need to calculate <math>HCF(15, 40) = 5</math> ie fruits will be equally distributed among 5 guests.</p>
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4.2 How many apples and bananas will each guest get?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Quantity based problem
Overarching Idea	Use of real Number
Context	LCM & HCF
Item Format	Closed and Open Constructive question
Cognitive Process	Logical thinking
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points  
 Partial Credit: 1 points  
 Nil Credit: 0 points

Description of Answer Key and Credits:

<p>Answers:          1 Full credit: 3 apples and 8 bananas any other response Nil Credit.</p> <p>Explanation:          1 Out of 15 apples, each guest will get <math>(15 \div 5) = 3</math> apples and out of 40 bananas, each guest will get <math>(40 \div 5) = 8</math> bananas.</p>
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4.3 If a guest claims that he got the highest no of fruits amongst all, is this situation possible? If yes, what will be the number of fruits that person got?



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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Quantity based problem
Overarching Idea	Use of real Number
Context	LCM & HCF
Item Format	Closed and Open Constructive test item
Cognitive Process	Logical thinking
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

Answers: 4.3 Full credit: Not possible any other response Nil Credit Explanation: 4.3 No guest can get fruits more than any guest.
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4.4 If the number of guests double then is it possible to distribute the fruits equally?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Quantity based problem
Overarching Idea	Use of real Number
Context	LCM & HCF
Item Format	Simple MCQ & Closed and Open Constructive answer
Cognitive Process	Logical thinking
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

### Description of Answer Key and Credits:

Answers:

4.4 Full credit: 1.5 apples and 4 bananas any other response Nil Credit.

Explanation:

4.4 Out of 15 apples, each guest will get  $(15 \div 10) = 1.5$  apples and out of 40 bananas, each guest will get  $(40 \div 10) = 4$  bananas.

## CCT PRACTICE ITEM - 05

<b>Domain:</b> Mathematical Literacy		<b>Theme:</b> Packaging supports	<b>Class:</b> X <b>Expected Time:</b> 15 minutes <b>Total Credit:</b> 10 Points
<b>Description of item"</b>		<b>Learning Outcome: (As per NCERT)</b> <ul style="list-style-type: none"> <li>✓ Acquire knowledge of basic concepts.</li> <li>✓ Apply the knowledge and skills needed to solve the problems, wherever possible.</li> </ul>	
yes	Text		
yes	Image		
yes	Table		
	Graph		
	Map		
	Poem		

An online shopping website sells `10 types of items which are packed into various sizes of cartons which are given below.

Carton type	Inner Dimensions (l x w)cm <sup>2</sup>
Small	6X8
Medium	12X24
Large	24X 36
Extra large	36 X 48
XXL	48 X 96



(Image source – google)

The company places supporting thermocol sheets inside every package along the edges. The company thought of procuring same sized sheets for all types of cartons.

5.1 What should be the maximum size of the sheet that fits into all type of cartons?

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 .....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Shape and Sizes
Overarching Idea	Geometry
Context	LCM & HCF
Item Format	Closed constructive responses
Cognitive Process	Data & geometry analysis
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

**Description of Answer Key and Credits:**

Answers:

5.1 Full credit: Dimension of required sheet is 6 x 4 and no credit for other responses.

Explanation:

5.1 To find dimension of maximum sized sheet which can be fitted in all carton, it is required that we should find HCF of length of all different sized cartons that is  $HCF(6,12,24,36,48) = 6$  and HCF of width of all cartons that is  $HCF(8,24,36,48,96) = 4$ .

5.2 How many such sheet sizes are possible?

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 .....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Shape and Sizes
Overarching Idea	Geometry
Context	LCM & HCF
Item Format	Closed constructive responses

Cognitive Process	Data & geometry analysis
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

<p>Answers:</p> <p>5.2 Full credit: Only one and no credit for other responses.</p> <p>Explanation:</p> <p>5.2 Because HCF of certain numbers is always unique so only one sized sheet is possible.</p>
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5.3 The company later introduced a new size of carton called semi large whose measurements are 14 X 15. Whether the existing maximum size sheet fits this shape?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Shape and Sizes
Overarching Idea	Geometry
Context	LCM & HCF
Item Format	Closed constructive responses
Cognitive Process	Data & geometry analysis
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

<p>Answers:</p> <p>5.3 Full credit: No and no credit for other responses.</p> <p>Explanation:</p>
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5.3 14 is not multiple of 6 and 15 is not multiple of 4 so it is not possible to have a carton with dimension 14 x 15.

5.4 What should have been the size of the semi large carton (which is larger than medium carton but smaller than large carton) so that the maximum sized sheet remains same?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Shape and Sizes
Overarching Idea	Geometry
Context	LCM & HCF
Item Format	Closed constructive responses
Cognitive Process	Data & geometry analysis
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

**Description of Answer Key and Credits:**

Answers:

5.4 Full credit: Open ended question but answer should be in the following form 18 x (multiple of 4 but not greater than 36) and no credit for other responses.

Explanation:

5.4 18 is the only multiple of 6 between 12 & 24 for length of semi sized carton and there are choices for width of semi sized cartons from 28 and 32, so possible answers are 18 x 28 and 18 x 32.

**CCT PRACTICE ITEM - 06**

<b>Domain:</b> Mathematical Literacy		<b>Theme:</b> Food Suppliers	<b>Class:</b> X <b>Expected Time:</b> 30 Minutes <b>Total Credit:</b> 10 Points
<b>Description of item"</b>		<b>Learning Outcome: (As per NCERT):</b>	
yes	Text	<ul style="list-style-type: none"> <li>To develop necessary skills of maths to understand</li> </ul>	

yes	Image	<p>real life problems.</p> <ul style="list-style-type: none"> <li>To correlate acquired knowledge and understanding to real life problem solving process.</li> </ul>
	Table	
	Graph	
	Map	
	Poem	

An agency supplies bread and jams to three places -a hospital, a bank and a school. Bread comes in a bunch of 8 pieces and Jam comes in a pack of 6 pieces. On a particular day, agency has supplied  $x$  packets of bread and  $y$  packets of jam to the school. On the same day, agency has supplied  $3x$  packets of bread along with sufficient packets of jam to hospital. It is known



that the number of students in the school are between 500 and 550.

Question:

6.1 How many students are there in school?

.....

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	1

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:  
6.1 Full credit: 504 students  
Nil credit: Any other responses.

Explanation:  
6.1 Firstly we will find LCM (8, 6) = 24. Now we will find a multiple of 24 in between 500 and 550 i.e., 504.

6.2 How many packets of bread are distributed in the school?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	1

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:  
6.2 Full credit: 63 packets of bread are distributed in the school.



Nil credit: Any other responses. Explanation:

6.2 For equal distribution of bread among each student, we need 504 pieces of bread.  
Hence, we need  $(504/8=63)$  i.e. 63 packets of bread.

6.3 How many packets of jams are distributed in the school?

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.....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

6.3 Full credit: 84 packets of jam are distributed in the school. Nil  
Credit: Any other responses.

Explanation:

6.3 For equal distribution of jam pieces among each student, we need 504 pieces of jam.  
Hence, we need  $(504/6=84)$  i.e. 84 packets of bread.

6.4 How many packets of bread are distributed in the hospital?

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.....  
.....

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

<p>Answers:</p> <p>6.4 Full credit: 189 packets of bread are distributed in the hospital.          Nil Credit: Any other responses. Explanation:          6.4 For hospital, we need 3x packets of bread i.e. <math>3 \times 63 = 189</math> packets of bread.</p>
---

6.5 How many packets of jams are distributed in the hospital?

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 .....

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution
Context	Multiplication of prime numbers
Item Format	Closed response
Cognitive Process	Analysis & Application
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

6.5 Full credit: 252 packets of jam are distributed in the hospital. Nil credit: Any other responses.

Explanation:

6.5 Since, number of bread pieces are  $(189 \times 8 = 1512)$  pieces, 1512 pieces of bread are required and so we need same number of jam pieces. Hence  $(1512 / 6 = 252)$  252 packets of jam are distributed in the hospital.

### CCT PRACTICE ITEM - 07

<b>Domain:</b> Mathematical Literacy	<b>Theme:</b> Seating Plan	<b>Class:</b> X <b>Expected Time:</b> 15 minutes <b>Total Credit:</b> 10 Points
<b>Description of item"</b>		<b>Learning Outcome: (As per NCERT)</b> <ul style="list-style-type: none"> <li>✓ Develop mastery of basic algebraic skills.</li> <li>✓ Feel the flow of reason while solving a problem.</li> </ul>
yes	Text	
yes	Image	
	Table	
	Graph	
	Map	
	Poem	

A hall has a certain number of chairs. Guests want to sit in different groups like in pairs, triplets, quadruplets, fives and sixes etc. When organizer arranges chairs in such pattern like in 2's, 3's, 4's 5's and 6's then 1, 2, 3, 4 and 5 chairs are left respectively. But when he arranges in 11's, no chair will be left.



(Image source – google)

Question: 7

7.1 In the hall, how many chairs are available?

- (a) 407                      (b) 143                      (c) 539                      (d) 209

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<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency Cluster	Data Analysis
Overarching Idea	Finding solution to real life problems

Context	Euclid's division Lemma
Item Format	Closed constructive response and MCQ
Cognitive Process	Problem solving strategy
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

<p>Answers:</p> <p>7.1 Full credit: 539 chairs.          Nil credit: Any other responses. Explanation:          7.1By dividing all the options by 2,3,4,5,6 and 11, we will get that 539 is the only option which leaves remainder 1,2,3,4,5,0 on division by the numbers 2,3,4,5,6,11 respectively.</p>
--

7.2If one chair is removed, which arrangements are possible now?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution to real life problems
Context	Euclid's division Lemma
Item Format	Closed constructive response and MCQ
Cognitive Process	Problem solving strategy
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

7.2 Full credit: pairs of 2 chairs is only possible now.

Nil credit: Any other responses. Explanation:

7.2 After removing 1 chair, we are left with 538 chairs. On arranging chairs in pair of 3's,4's,5's,6's,11's ;1,2,3,4,10 chairs are left. So, only pair of 2 chairs is possible now.

7.3 If one chair is added to the total number of chairs, how many chairs will be left when arranged in 11's.

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Data Analysis
Overarching Idea	Finding solution to real life problems
Context	Euclid's division Lemma
Item Format	Closed constructive response and MCQ
Cognitive Process	Problem solving strategy
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

7.3 Full credit: 1 chair will be left.

Nil Credit: Any other responses Explanation:

7.3 539 chairs are already arranged in pair of 11's .On adding 1 extra chair, that 1 chair will be left only.

7.4 What will happen to the arrangement if same number of chairs will be arranged in 7's?

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<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency Cluster	Data Analysis
Overarching Idea	Finding solution to real life problems
Context	Euclid's division Lemma
Item Format	Closed constructive response and MCQ
Cognitive Process	Problem solving strategy
Proficiency Level	3

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

7.4 Full credit: No chair will be left.

Nil Credit: Any other responses.

Explanation:

7.4 On arranging chairs in pair of 7's, no chair will be left.

**CCT PRACTICE ITEM – 08**

<b>Domain:</b> Mathematical Literacy	<b>Theme: Indian Army</b>	<b>Class: X</b> <b>Expected Time: 15 minutes</b> <b>Total Credit: 10 points</b>
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Description of item”		Learning Outcome: (As per NCERT) <input type="checkbox"/> To develop ability to think. <input type="checkbox"/> To develop an interest in students to study Mathematics as discipline.
yes	Text	
yes	Image	
	Table	
	Graph	
	Map	
	Poem	

Indian Army is the third biggest military contingent in the World next to USA and China. However, there are many firsts that make Indian army stand out in the world, making us all Indians very proud. Knowing them, will help you celebrate Republic day with greater vigour and gratitude. Rena get the chance to see the republic day parade on the 71th republic day Parade in Delhi, where she see on the Raj path an Army contingent of 616 members is to march behind an army band of 32 members in a parade the sequence is followed by a CRPF troops with 468 soldiers are to march behind the 222 members of bikers. These two groups are to march in the same number of columns. This sequence of soldiers by different states Jhanki which are showing the culture of the respective states. Seeing all this she got thrilled with proud.



(Image source – google)

Questions:

8.1 What is the maximum number of columns in which the army troop can march?

.....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Real numbers
Context	Indian Army Parade
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2



**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

<p><b>Answers:</b></p> <p>8.1 Full credit: 8 columns. Nil credit: Any other responses.</p> <p><b>Explanation:</b></p> <p>8.1 We will find the HCF (616, 32) = 8.</p>
--

8.2 What is the maximum number of columns in which the CRPF troop can march?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Real numbers
Context	Indian Army Parade
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

8.2 Full credit: 6 columns.

Nil credit: Any other responses.

**Explanation:**

8.2 We will find the HCF (222,468) = 6.

8.3 What value should be added or subtracted with the No of CRPF soldiers and the number of bikers so that combined value gives us maximum no of columns?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Real numbers
Context	Indian Army Parade
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

8.3 Full credit: 9 Soldiers will be subtracted from CRPF Soldiers and 19 bikers will be added to the number of bikers.

**Explanation:**

8.3 According to the question  $HCF = 468x + 222y$  now we will find the values of x and y and here  $HCF = 6$ . Hence, value of  $x = -9$  and  $y = 19$ .

8.4 Maximum no of columns in which total army soldiers & CRPF soldier's together & Total band members & bikers together can march past?

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 .....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Real numbers
Context	Indian Army Parade
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

8.4 Full credit: 2.

Nil Credit: Any other responses.

**Explanation:**

8.4 According to the question, we have to find out HCF (616+468, 222+32) = 2.

8.5 What value makes the, product of no. of army soldiers and band members equal to the maximum no. of columns in which they can march?

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FRAMEWORK	CHARACTERISTICS
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Competency Cluster	Number system
Overarching Idea	Real numbers
Context	Indian Army Parade
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

8.5 Full credit: 2464.

Nil Credit: Any other responses.

**Explanation:**

8.5 According to the question,  $HCF \times Value = \text{Product of two numbers}$ . Here  $Value = LCM$ . After putting all the values of HCF and Product of two numbers, we will get  $LCM = 2464$ .

**CCT PRACTICE ITEM - 09**

<b>Domain:</b> Mathematical Literacy		<b>Theme:</b> Origin of real number	<b>Class: X</b> <b>Expected Time: 15 minutes</b> <b>Total Credit: 10 Points</b>
<b>Description of item"</b>		<b>Learning Outcome: (As per NCERT)</b> ✓To develop critical thinking. ✓To feel the flow of reasoning behind answer.	
yes	Text		
yes	Image		
	Table		

	Graph	
	Map	
	Poem	

The world of numbers is an adventurous place, where the simplest idea of any number is related to counting. Obviously we cannot start counting from zero because in any situation if there is nothing to count then how anyone can count nothing?

Nothing can have many expressions, for example – In a cricket team, no player has been selected then it can be expressed as zero team, zero batsmen, zero bowlers etc. But in the world of numbers, zero plays a significant role to create difference between 1 & 10.

Then in this world new state comes into picture i.e negative numbers. They do express their own meaning which can be compared with our real life too, in which we can go back from present.

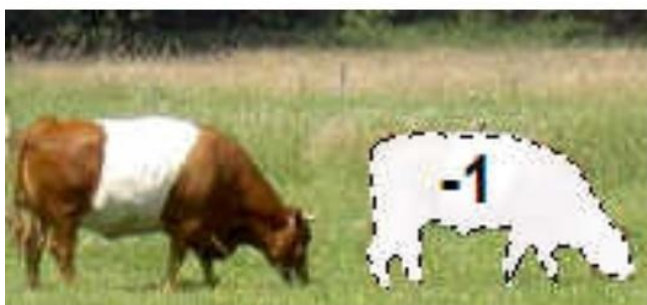
So having negative numbers enhance the capacity of numbers that is we can count forward and backward both.

Real numbers include two groups of numbers such as rational and irrational number.

Questions:

In reference of negative numbers can you check possibility of following situation in real life? Justify your answer with proper reasoning.

9.1 A farmer is having -1 number of cow.



(Image source – math is fun)

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Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Introduction of numbers

Context	Evolution of numbers
Item Format	Closed and open constructed response
Cognitive Process	Employing the concept
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:

9.1 Full credit: Yes or No with right reasoning Nil  
 credit: Any other responses.

Explanation:

9.1 No, because objects cannot be represented in negative. Yes, it shows that the farmer has debt of one cow.

9.2 Temperature at Jammu is normally cross 0°C in winters.



(Image source – google)

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Introduction of numbers

Context	Evolution of numbers
Item Format	Closed and open constructed response
Cognitive Process	Employing the concept
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

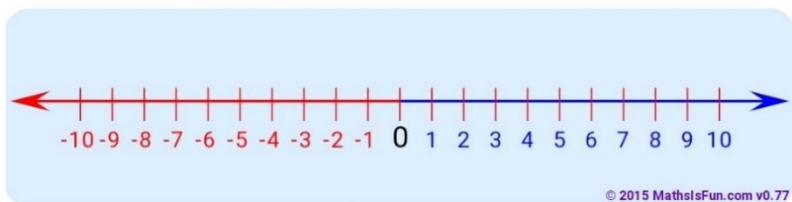
Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

<p>Answers:</p> <p>9.2 Full credit: Yes</p> <p>Nil credit: Any other responses.</p> <p>Explanation:</p> <p>9.2 Yes, temperature can be negative and positive both.</p>
--

See following real line and answer following questions:



(Image source – math is fun)

9.3 Arrange 2, 4, -5, 0, -2.5, -9.2, 6.3 in descending order.

.....

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Introduction of numbers
Context	Evolution of numbers
Item Format	Closed and open constructed response
Cognitive Process	Employing the concept

Proficiency Level	2
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**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

<p>Answers:</p> <p>9.3 Full credit: 6.3 &gt; 4 &gt; 2 &gt; 0 &gt; -2.5 &gt; -5 &gt; -9.2 Nil</p> <p>Credit: Any other responses.</p> <p>Explanation:</p> <p>9.3 Left to Right, value of numbers increase.</p>
---

9.4 How many real numbers are possible between 1.2 & 1.23?

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Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Introduction of numbers
Context	Evolution of numbers
Item Format	Closed and open constructed response
Cognitive Process	Employing the concept
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 point

Nil Credit: 0 point

Description of Answer Key and Credits:

Answers:
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9.4 Full credit: Infinite

Nil Credit: Any other responses.

Explanation:

9.4 In between any two real numbers, there exists infinite real numbers which include rational and irrational both.

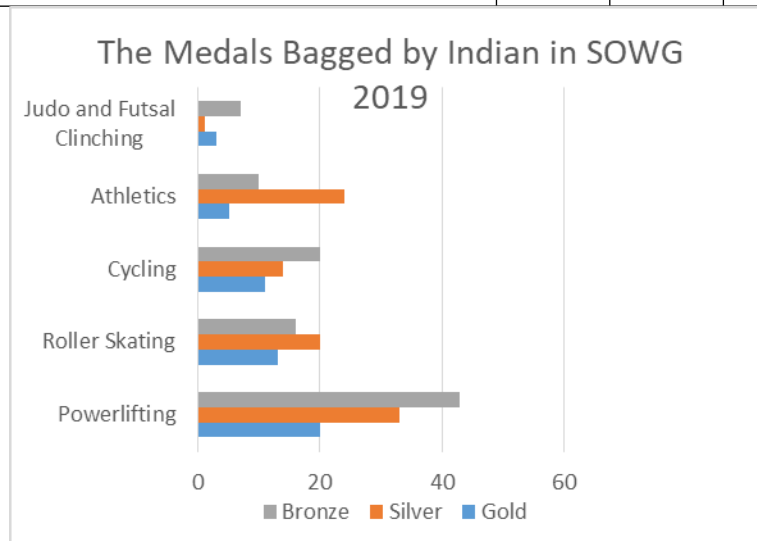
## CCT PRACTICE ITEM - 10

<b>Domain:</b> Mathematical Literacy		<b>Theme: Special Olympiad World Game (SOWG)</b>		<b>Class: X</b> <b>Expected Time: 15 minutes</b> <b>Total Credit: 10 points</b>	
<b>Description of item"</b>			<b>Learning Outcome: (As per NCERT)</b> <input type="checkbox"/> To develop ability to think. <input type="checkbox"/> To develop an interest in students to study Mathematics as discipline.		
<b>yes</b>	Text				
	Image				
<b>yes</b>	Table				
<b>yes</b>	Graph				
	Map				
	Poem				

India returned with a whopping tally of 368 medals as the Special Olympics World Game (SOWG) 2019 came to end in Abu Dhabi. India scripted history in UAE by scooping gold, silver and bronze medal.

Medals were won across all sports- athletics, golf, volleyball, aquatic, cycling, judo, powerlifting, TT, roller skating, badminton, basketball traditional, handball traditional, and football 7-side female. Indian bagged the medals as given in following table According to events.

Events	Gold	Silver	Bronze
Powerlifting	20	33	43
Roller Skating	13	20	16
Cycling	11	14	20
Athletics	5	24	10
Judo and Futsal Clinching	3	1	7



(Image source – google)

Question:

10.1 What is the HCF of the number of gold medal to the number of silver medal won by Indian player?

.....  
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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Application of LCM & HCF
Context	Global
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

10.1 Full credit: 4.

Nil credit: Any other responses.

**Explanation:**

10.1 We will find the sum of gold and silver medals first, then we will find HCF of total numbers.

HCF (92, 52) =4.

10.2 What is the least common multiple of total number of gold, silver and bronze medal?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Application of LCM & HCF
Context	Global

Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

<p><b>Answers:</b>  10.2 Full credit: 28704.  Nil credit: Any other responses.</p> <p><b>Explanation:</b>  10.2 We will find the LCM of total number of gold, silver and bronze medals. LCM (52, 92, 96) =28704.</p>
--

10.3 Using above information justify the statement

HCF (total gold, total silver, total bronze)  $\neq$  Product of total number of gold, silver and bronze medals. (YES/NO)

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.....  
.....

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Application of LCM & HCF
Context	Global
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

<b>Answers:</b>
-----------------

10.3 Full credit: YES.

Nil Credit: Any other responses.

**Explanation:**

10.3 The statement is correct. We can also prove it by taking total of gold, silver and bronze medal, then find LCM and HCF.

10.4 What value makes the product of total number of gold and silver medals equal to the maximum no of medals they got in both?

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FRAMEWORK	CHARACTERISTICS
Competency Cluster	Number system
Overarching Idea	Application of LCM & HCF
Context	Global
Item Format	Closed constructive responses
Cognitive Process	Constructive approach
Proficiency Level	2

**Credit Pattern:**

Full Credit: 2.5 points

Partial Credit: 1 points

Nil Credit: 0 points

Description of Answer Key and Credits:

**Answers:**

10.4 Full credit: 1196.

Nil Credit: Any other responses.

**Explanation:**

10.4 According to the statement, we will use the concept  $HCF \times LCM = \text{PRODUCT OF TWO NUMBERS}$ . Hence, find LCM. Hence,  $LCM = 1196$ .

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Name of the Kendriya Vidyalaya: KV Rangapahar & KV Dimapur

KVS Region: Tinsukia Region

**CRITICAL AND CREATIVE THINKING ITEMS**

**CLASS X : CHAPTER 2 : LINEAR EQUATION IN TWO VARIABLES**

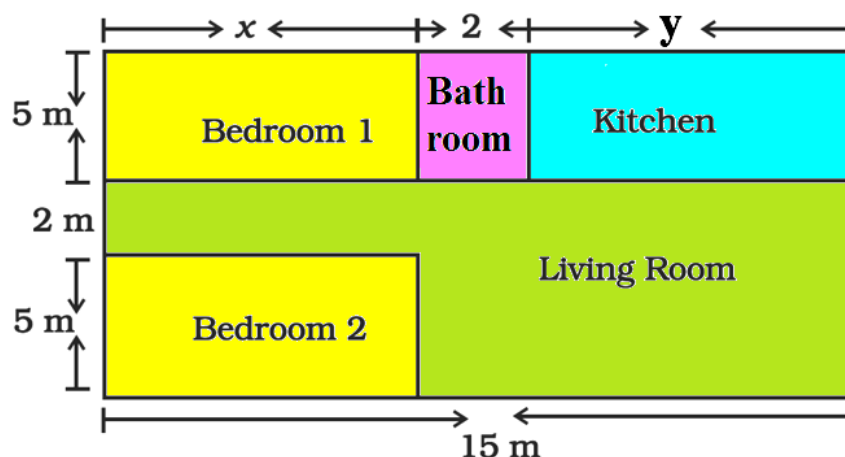
**INDEX**

<b>S.No.</b>	<b>Theme of the item</b>
11.	Layout
12.	Fishing
13.	Building layout
14.	Stationery
15.	Stationery – 2
16.	Tour to Kedarnath
17.	Santa's sleigh
18.	Exhibition
19.	Travelling by Boat
20.	Finding the password

### Practice Item 01 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b> <b>Layout</b>	Class(es): <b>X</b> Expected time: <b>10 min</b> Total Credit: <b>10</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

In the below given layout, the design and measurements has been made such that area of two bedrooms and Kitchen together is 95 sq. m.



Based on the above layout and situation, answer the following questions:

(i) Form the pair of linear equations in two variables from this situation.

#### Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	5

#### Description of Answer Key and Credits:

Area of two bedrooms =  $10x$  sq.m

Area of kitchen =  $5y$  sq. m

So,  $10x + 5y = 95 \Rightarrow 2x + y = 19$

Also,  $x + 2 + y = 15 \Rightarrow x + y = 13$



**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find the length of the outer boundary of the layout.

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**Length of outer boundary =  $12 + 15 + 12 + 15 = 54$  m**Credit Pattern:**

Full Credit: 2 for Correct answer

No Credit: 0 for any other answer

(iii) Find the area of each bedroom and kitchen in the layout.

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**Solving  $2x + y = 19$  and  $x + y = 13$ , we get  $x = 6$  m and  $y = 7$  mArea of bedroom =  $5 \times 6 = 30$  sq. mArea of kitchen =  $5 \times 7 = 35$  sq. m

**Credit Pattern:**

Full Credit: 2 for both correct answer

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iv) Find the area of living room in the layout.

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	5

**Description of Answer Key and Credits:**Area of living room =  $(15 \times 7) - 30 = 105 - 30 = 75$  sq. m**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

(v) Find the cost of laying tiles in Kitchen at the rate of Rs. 50 per sq. m

(a) Rs. 1500

(b) Rs. 2000

(c) Rs. 1750

(d) Rs. 3000

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Simple Multiple Choice
Cognitive Process	Interpret and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**Cost of  $1\text{m}^2$  laying tiles in kitchen = Rs. 50Total cost of laying tiles in kitchen =  $\text{Rs. } 50 \times 35 = \text{Rs. } 1750$ 

Correct option is (c)

**Credit Pattern:**

Full Credit: 2 for Correct option is (c)  
No Credit: 0 for any other answer

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Name of the Vidyalaya: KV Gachibowli  
KVS Region: Hyderabad

### Practice Item 02 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b> Fishing	Class(es): <b>X</b> Expected time: <b>10 min</b> Total Credit: <b>08</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

On a bright Sunday morning three friends A, B and C decided to go on river for fishing and boating. They decided to leave for the place together in the evening. The journey was smooth, it just went as scheduled then they reached to the river, and started to set the boat on sail. They were enjoying their ride with full speed. They started boating from a place to another place which is at a distance of 42 km and then again returns to the starting place. They took 20 hours in all. The time taken by them riding downstream in going 14 km is equal to the time taken by them riding upstream in going 6 km.



**Based on the above situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	6

**Description of Answer Key and Credits:**

Let the speed of the boat be  $x$  km/hr and that of river be  $y$  km/hr

Speed of the boat in downstream =  $x + y$  km/hr

Speed of the boat in upstream =  $x - y$  km/hr

According to the statement,  $\frac{42}{x+y} + \frac{42}{x-y} = 20 \Rightarrow \frac{21}{x+y} + \frac{21}{x-y} = 10$  and

$$\frac{14}{x+y} = \frac{6}{x-y} \Rightarrow \frac{7}{x+y} - \frac{3}{x-y} = 0$$

Let  $\frac{1}{x+y} = p$  and  $\frac{1}{x-y} = q$  then we have  $21p + 21q = 10$  and  $7p - 3q = 0$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find the speed of the boat in still water and the speed of river.

Mathematical Literacy

Framework	Characteristics
-----------	-----------------

Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	5

**Description of Answer Key and Credits:**

Solving  $21p + 21q = 10$  and  $7p - 3q = 0$ , we get  $p = \frac{1}{7} = \frac{1}{x+y} \Rightarrow x + y = 7$  and

$$q = \frac{1}{3} = \frac{1}{x-y} \Rightarrow x - y = 3$$

Again solving  $x + y = 7$  and  $x - y = 3$ , we get  $x = 5$  and  $y = 2$

Speed of the boat = 5 km/hr

Speed of the river = 2 km/hr

**Credit Pattern:**

Full Credit: 2 for two correct answers

Partial Credit: 1 for any one correct answer.

No Credit: 0 for incorrect answers.

(iii) The speed of boat in upstream is

(a) 5 km/hr

(b) 2 km/hr

(c) 3 km/hr

(d) 6 km/hr

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Simple multiple choice
Cognitive Process	Interpret and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**

Speed of the boat in upstream =  $5 - 2 = 3$  km/hr

So, correct option is (c) 3 km/hr

**Credit Pattern:**

Full Credit: 2 for Correct option is (c)

No Credit: 0 for any other answer

(iv) At what time they will reach the destination, if the speed of boat is increased by 1 km/hr and the speed of river is decreased by 1 km/hr?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	5

**Description of Answer Key and Credits:**

$$\text{Time} = \frac{42}{6+1} + \frac{42}{6-1} = 6 + 8.4 = 14.4 \text{ or } 14 \text{ hrs } 24 \text{ min}$$

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

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### Practice Item 03 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>  Building Layout	Class(es): <b>X</b>  Expected time: <b>10 min</b>  Total Credit: <b>08</b>
Description of Item:  <b>Text and Image</b>	Learning Outcomes(As per NCERT):  Representing the situation in linear equation in two variables and Problem solving.	

Aditi purchased an independent house in Hyderabad with ground floor only. Aditi thought of constructing 1 bedroom flat in first floor as per the layout given below. She enquired about the labour in the Society. She came to know that 3 men and 4 women could finish this work in 28 days. But she wanted the work completed in only 5 days. When she enquired again, she was told that 4 men and 6 women could finish the work in 20 days.



**Based on the above layout and situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

#### Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate

Proficiency Level	6
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**Description of Answer Key and Credits:**

Let the one man can alone finish the work in x days and one woman can finish the work in y days.

According to the statement, we have

$$\frac{3}{x} + \frac{4}{y} = \frac{1}{28} \text{ and } \frac{4}{x} + \frac{6}{y} = \frac{1}{20}$$

Let  $\frac{1}{x} = p$  and  $\frac{1}{y} = q$  then we get  $3p + 4q = \frac{1}{28}$  and  $4p + 6q = \frac{1}{20}$

$$84p + 112q = 1 \text{ and } 80p + 120q = 1$$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find out that how much time would be taken to finish the work if one man or one woman worked alone?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**

Solving  $84p + 112q = 1$  and  $80p + 120q = 1$ , we get

$$p = \frac{1}{140} = \frac{1}{x} \Rightarrow x = 140 \text{ and } q = \frac{1}{280} = \frac{1}{y} \Rightarrow y = 280$$

Hence, a man alone can finish work in 140 days and a woman alone can finish the work in 280 days.

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iii) In how many days 8 men and 12 women could finish the work?

Mathematical Literacy

Framework	Characteristics
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Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

8 men and 12 women can finish the work in 10 days

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

(iv) In how many days 6 men and 8 women could finish the work?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	5

**Description of Answer Key and Credits:**

6 men and 8 women can finish the work in 14 days

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

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**Practice Item 04 for Mathematical Literacy**

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b> Stationery	Class(es): <b>X</b> Expected time: <b>10 min</b> Total Credit: <b>08</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

Deepak bought 3 notebooks and 2 pens for Rs. 80. His friend Ram said that price of each notebook could be Rs. 25. Then three notebooks would cost Rs.75, the two pens would cost Rs.5 and each pen could be for Rs. 2.50. Another friend Ajay felt that Rs. 2.50 for one pen was too little. It should be at least Rs. 16. Then the price of each notebook would also be Rs.16.



Lohith also bought the same types of notebooks and pens as Aditya. He paid 110 for 4 notebooks and 3 pens.



**Based on the above layout and situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

**Mathematical Literacy**

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	3

**Description of Answer Key and Credits:**

Let the cost of one notebook be Rs.  $x$  and that of pen be Rs.  $y$ .  
 According to the statement, we have  
 $3x + 2y = 80$  and  $4x + 3y = 110$

**Credit Pattern:**

Full Credit: 2 for two correct equations  
 Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find whether the estimation of Ram and Ajay is applicable for Lohith?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	4

**Description of Answer Key and Credits:**

Consider the prices mentioned by Ram.

If the price of one notebook is Rs. 25 and the price of one pen is Rs. 2.50 then,

The cost of 4 notebooks would be :  $4 \times 25 = \text{Rs.}100$

And the cost for 3 pens would be :  $3 \times 2.50 = \text{Rs.} 7.50$

Lohith should have paid Rs.  $100 + \text{Rs.}7.50 = \text{Rs.}107.50$  but he paid Rs. 110.

Therefore, Ram's estimation is wrong.

Now, consider the prices mentioned by Anil. Then,

The cost of 4 notebooks, if one is for Rs.16, would be :  $4 \times 16 = \text{Rs.} 64$

And the cost for 3 pens, if one is for Rs. 16, would be :  $3 \times 16 = \text{Rs.} 48$

Lohith should have paid Rs. $64 + \text{Rs.}48 = \text{Rs.}112$  but this is more than the price he paid.

Therefore, Ajay's estimation is also wrong.

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iii) Find the exact cost of the notebook and the pen?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Solving  $3x + 2y = 80$  and  $4x + 3y = 110$ , we get

$x = 20$  and  $y = 10$

Cost of 1 notebook = Rs. 20 and Cost of 1 pen = Rs. 10

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iv) Find the total cost if they will purchase the same type of 15 notebooks and 12 pens.

**Mathematical Literacy**

<b>Framework</b>	<b>Characteristics</b>
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Total cost = Rs.  $15 \times 20 + 12 \times 10 = 300 + 120 =$  Rs. 420

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

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### Practice Item 05 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>  Stationery – 2	Class(es): <b>X</b>  Expected time: <b>12 min</b>  Total Credit: <b>10</b>
Description of Item:  <b>Text and Image</b>	Learning Outcomes(As per NCERT):  Representing the situation in linear equation in two variables and Problem solving.	

Two teachers A and B went to a ‘Sale’ to purchase geometry box and notebooks for the prize distribution in Mathematics Quiz which will be organized next week in the school. The number of geometry box is one less than the number of notebooks purchased. Also, the three times number of geometry box is 12 less than two times the number of notebooks purchased”.



**Based on the above layout and situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Educational/Occupational
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	3

**Description of Answer Key and Credits:**

Let the number of geometry box be  $x$  and that of notebook be  $y$ .  
 According to the statement, we have  $x = y - 1 \Rightarrow x - y + 1 = 0$   
 and  $3x = 12 - 2y \Rightarrow 3x + 2y - 12 = 0$

**Credit Pattern:**

Full Credit: 2 for two correct equations  
 Partial Credit: 1 for any one correct equation.  
 No Credit: 0 for incorrect equation.

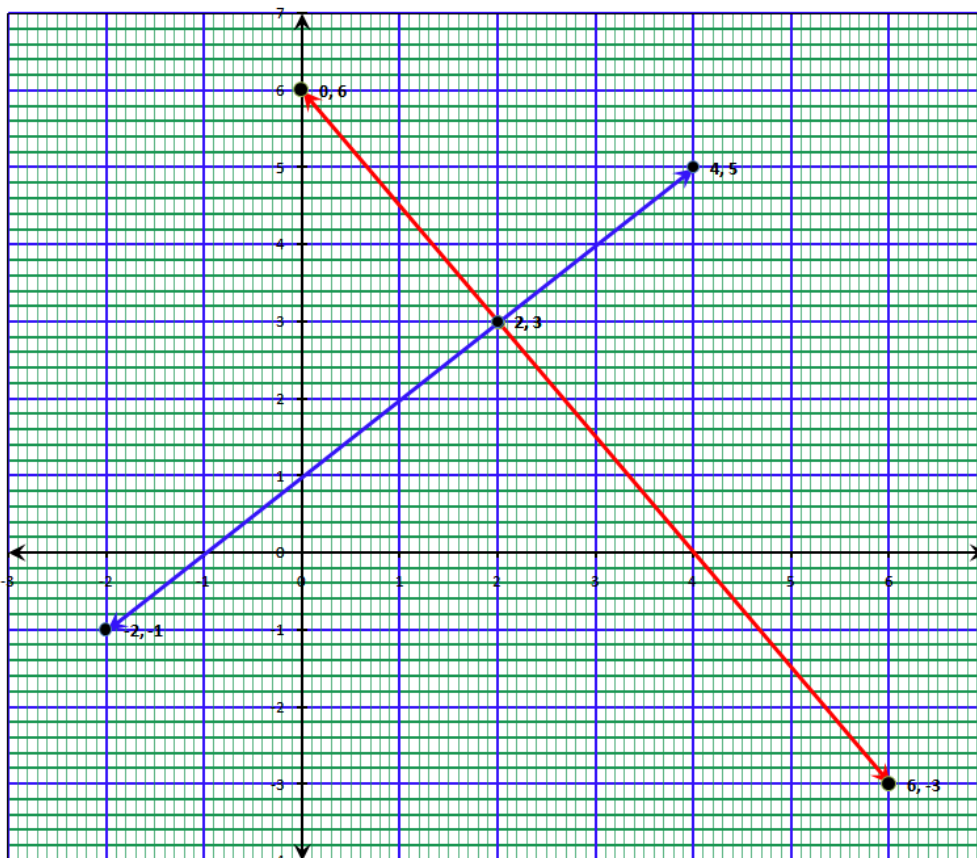
(ii) Draw the graphs of the above equations.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Educational/Occupational
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Graphs of  $x - y + 1 = 0$  and  $3x - 2y - 12 = 0$  is



**Credit Pattern:**

Full Credit: 2 for Correct graph

No Credit: 0 for incorrect graph

(iii) How many geometry boxes and notebooks teachers bought for the school?

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Educational/Occupational
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

The point of the intersection of two lines is (2, 3). Therefore the number of geometry boxes is 2 and that of notebooks is 3.

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iv) Determine the coordinates of the vertices of the triangle formed by these lines and the y-axis.

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

The coordinates of the vertices of the triangle formed by these lines and the y-axis are (0, 6), (2, 3) and (0, 1).

**Credit Pattern:**

Full Credit: 2 for all three correct coordinates

Partial Credit: 1 for any two correct coordinates

No Credit: 0 for any other answer



(v) Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis.

**Mathematical Literacy**

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

The coordinates of the vertices of the triangle formed by these lines and the x-axis are  $(-1, 0)$ ,  $(2, 3)$  and  $(4, 0)$ .

**Credit Pattern:**

Full Credit: 2 for all three correct coordinates

Partial Credit: 1 for any two correct coordinates

No Credit: 0 for any other answer

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**Practice Item 06 for Mathematical Literacy**

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>	Class(es): <b>X</b> Expected time: <b>10 min</b> Total Credit: <b>08</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

**TOUR TO KEDARNATH**



When I was travelling from New York to California, I met Yogi from Indian origin and we talked a lot about the diversity of culture of that country. On my visit to India, I went to Kedarath Shrine, India. I found the rents of horses and Chopper (helicopter) to carry the pilgrims to from the foot of the hill to shrine, which is on the mountain. . During one day the business has a total of 25 rentals and collects \$ 225 for the rentals. There was a board of showing the cost of the ride

RIDE	PRICE in \$
Horse	5
Chopper (Helicopter)	10

**Based on the above situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	4

**Description of Answer Key and Credits:**

Let  $x$  be the number of horses hired and  $y$  be the number of passengers travelled in helicopter (chopper) then we have  $x + y = 25$ ,  $5x + 10y = 225$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find the number of horses rented and tourists travelled in helicopter (chopper)

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Solving equations  $x + y = 25$ ,  $5x + 10y = 225$ , we get  $x = 5$  and  $y = 20$

Number of horses rented = 5

Number of tourists travelled in helicopter (chopper) = 20

**Credit Pattern:**

Full Credit: 2 for both Correct answer

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iii) In the peak period on the demand, if the rental of horse is increased by 3 times of the actual and rental for chopper (Helicopter) is 2 times of the actual then how much the total rent collected for 75 travelers?

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

For horse riding rental = Rs.  $15 \times 75 =$  Rs. 1125

For helicopter rental = Rs.  $20 \times 75 =$  Rs. 1500

Total Rental = Rs. 2625

**Credit Pattern:**

Full Credit: 2 for both correct answer

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iv) What is the percentage of increased rental if the 125 travelers are travelled in the peak period to the 75 travelers?

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection

Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	5

**Description of Answer Key and Credits:**

Actual rental for 125 travelers = Rs. 15 x 125 + Rs. 20 x 125 = Rs. 4375

Rental for 75 travelers = Rs. 2675

Increased rental = Rs. 4375 – Rs. 2675 = Rs. 1700

Percentage =  $\frac{1700}{2675} \times 100 = 63.55\%$  (Approx)

**Credit Pattern:**

Full Credit: 2 for both correct answer

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

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**Practice Item 07 for Mathematical Literacy**

Domain:	Theme: <b>Linear Equation in two</b>	Class(es): <b>X</b>
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<b>Mathematical Literacy</b>	<b>variables</b> Santa's sleigh	Expected time: <b>08 min</b> Total Credit: <b>06</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	



There are some toy horses and toy clowns on Santa's sleigh. Together they have 45 heads and 148 feet.

**Based on the above situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	2

**Description of Answer Key and Credits:**

Let the number of toy horses be  $x$

Let the number of toy clowns be  $y$

So,  $x + y = 45$

and  $4x + 2y = 148 \Rightarrow 2x + y = 74$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) Find the number of toy horses and the number of toy clowns.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Simple multiple choice
Cognitive Process	Formulate and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**

Solving the equations  $x + y = 45$  and  $2x + y = 74$ , we get  $x = 29$  and  $y = 16$

Number of toy horses = 29

Number of toy clowns = 16

**Credit Pattern:**

Full Credit: 2 for two correct answers

Partial Credit: 1 for any one correct answer.

No Credit: 0 for any other answers.

(iii) If the number of toy horses is 15 and the number of toy clowns is 30, then the total legs is

(a) 120

(b) 100

(c) 140

(d) none of these

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Simple multiple choice
Cognitive Process	Employ
Proficiency Level	2

**Description of Answer Key and Credits:**

Number of legs =  $4 \times 15 + 2 \times 30 = 60 + 60 = 120$

So, correct option is (a) 120

**Credit Pattern:**

Full Credit: 2 for Correct option is (a)

No Credit: 0 for any other option

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**Practice Item 08 for Mathematical Literacy**

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>	Class(es): <b>X</b> Expected time: <b>10 min</b> Total Credit: <b>08</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

**EXHIBITION**

Yesterday I went to an exhibition and I saw a board showing the information of the admission fee at the exhibition gate is \$1.50 for children and \$4.00 for adults.one day, I checked that 2200 people entered the exhibition and on my verification found \$5050 is collected.



**Based on the above layout and situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Employ and Interpret
Proficiency Level	3

**Description of Answer Key and Credits:**

Let the number of children visited =  $x$  and the number of adults visited =  $y$

Obtaining the equations  $x + y = 2200$  and  $1.50x + 4y = 5050 \Rightarrow 3x + 8y = 10100$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) How many children and adults attended?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	2

**Description of Answer Key and Credits:**

Solving the equations:  $x + y = 2200$  and  $3x + 8y = 10100$ , we get  $x = 1500$ ,  $y = 700$

Number of children attended = 1500

Number of adults attended = 700

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iii) How many amount collected if 2000 children and 800 adults attended?



Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Amount =  $1.5 \times 2000 + 4 \times 800 = 3000 + 3200 = \$6200$

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

(iv) One day the total amount collected is Rs 4387.50 then the number of children and adults attended, if the total attended children and adults together is 1675.

- (a) (1150,525)    (b)(750, 925)    (c)(925,750)    (d) (1300, 375)

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Solving the equations  $x + y = 1675$

$$1.50x + 4y = 4387.50$$

Obtain the values  $x = 925, y = 750$

i.e Number of children = 925

Number of adults = 750.

So, correct option is (c)(925,750)

**Credit Pattern:**

Full Credit: 2 for Correct option is (c)

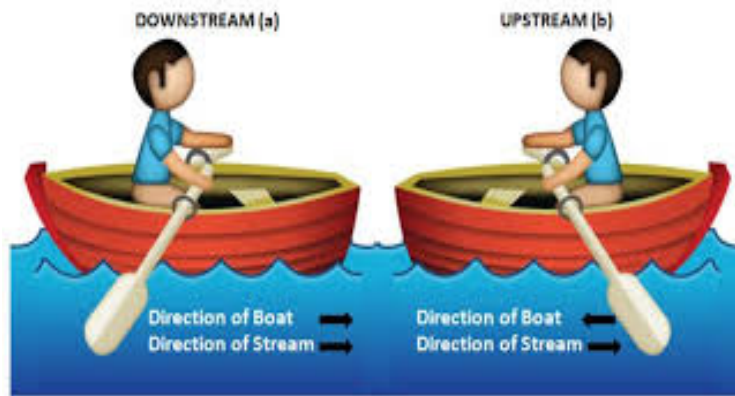
No Credit: 0 for any other option

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### Practice Item 09 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>	Class(es): <b>X</b> Expected time: <b>08 min</b> Total Credit: <b>06</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	



### Travelling by Boat

Upstream is where the flow of water originates. Downstream is where the flow ends, at the opposite end of the waterway.

Boaters are often uncertain about which side of a channel marker they should pass. This is because they are not sure whether they are travelling upstream or downstream.

On the road drivers cannot deviate from the structured roadway system. How a vehicle is to be driven safely is determined using marked roadways, stop signs, traffic lights and speed limits. On the water you are confronted with an expansive waterway where there are no lines to guide your passage. In addition, you are dealing with wind, tide changes, heightened sea states and unfamiliar marks and beacons.

It is important for skippers to know the upstream and downstream rule so that they can identify which side of a particular channel marker to pass safely and not run a ground.

Ram and Lakshman are friends. So on fine one day they went for boating. Ram travelled 30 km upstream and 44 km downstream in 10 hours. Lakshman travelled 40 km upstream and 55 km downstream in 13 hours.

**Based on the above layout and situation, answer the following questions:**

(i) Form the pair of linear equations in two variables from this situation.

#### Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate
Proficiency Level	4

#### **Description of Answer Key and Credits:**

Let the speed of the boat in still water =  $x$  km/h

Let the speed of the stream =  $y$  km/h

Upstream speed =  $(x - y)$  km/h

Downstream speed= ( x + y) km/h

Equations are  $\frac{30}{x-y} + \frac{44}{x+y} = 10$

$\frac{40}{x-y} + \frac{55}{x+y} = 13$

Taking  $\frac{1}{x-y} = a$ ,  $\frac{1}{x+y} = b$

Pair of linear equations are  $30 a + 44 b = 10$  and  $40 a + 55 b = 13$

**Credit Pattern:**

Full Credit: 2 for two correct equations

Partial Credit: 1 for any one correct equation.

No Credit: 0 for incorrect equation.

(ii) What is the speed of the boat instill water?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	4

**Description of Answer Key and Credits:**

Solving equations are  $30 a + 44 b = 10$  and  $40 a + 55 b = 13$ , we get  $a = \frac{1}{5}$  and  $b = \frac{1}{11}$

Resubstituting the values of a and b we get  $x - y = 5$  and  $x + y = 11$

Solving again  $x - y = 5$  and  $x + y = 11$ . we get  $x = 8$

The speed of the boat in still water = 8km/h

**Credit Pattern:**

Full Credit: 2 for correct answers

No Credit: 0 for any other answer

(iii) What is the speed of the stream?

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ

Proficiency Level	3
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**Description of Answer Key and Credits:**

Solving  $x - y = 5$  and  $x + y = 11$ . we get  $y = 3$

The speed of the stream = 3 km/h

**Credit Pattern:**

Full Credit: 2 for correct answers

No Credit: 0 for any other answer

(iv) What is the speed of the boat while going downstream?

(a) 5km/h (b) 11km/h (c) 8km/h (d) 3km/h

**Mathematical Literacy**

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Simple Multiple Choice
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

Speed of the boat in still water = 8km/h

Speed of the stream = 3km/h

Speed of the boat while going downstream =  $(8 + 3)$  km/h = 11km/h

The correct option is (b).

**Credit Pattern:**

Full Credit: 2 for correct option (b)

No Credit: 0 for any other option

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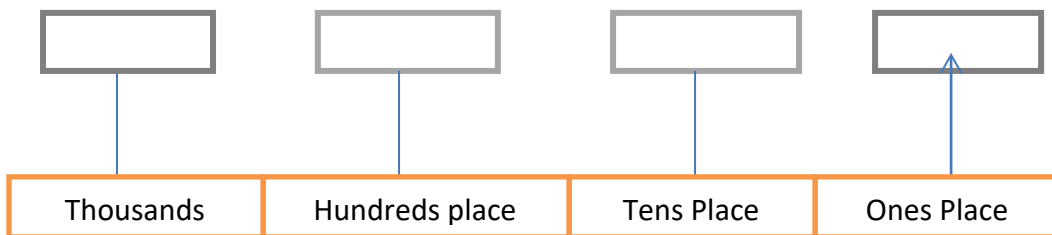
KVS Region: Hyderabad

### Practice Item 10 for Mathematical Literacy

Domain: <b>Mathematical Literacy</b>	Theme: <b>Linear Equation in two variables</b>	Class(es): <b>X</b> Expected time: <b>12 min</b> Total Credit: <b>10</b>
Description of Item: <b>Text and Image</b>	Learning Outcomes(As per NCERT): Representing the situation in linear equation in two variables and Problem solving.	

### FINDING THE PASSWORD

Ruhi, Amisha and Ravi are friends , they share the same locker in school.  
 Ruhi said to them I forgot the password of the locker that we are using but remember That it's a 4 digit number and the digit in hundreds place is twice the digit in thousands place.  
 Amisha said sum of digits in tens and thousands place is equal to difference of digits In hundreds place and ones place and is equal to 5.  
 Ravi said I remember that digit in ones place is half of the digit in tens place.



**Based on the above situation, answer the following questions:**

(i) Below are three statements about the equations. Are the statements correct?  
 Circle “ YES “ or “ NO “ for each statement.

Statement	Is the statement correct ?
Ravi says the equations are $x + y = 5$ and $2x - y = 5$	YES / NO
Amisha says its	

$x + y = 5$ and $2x - y = 10$	YES / NO
Ruhi says its $x + y = 5$ and $4x - y = 10$	YES / NO.

#### Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Complex Multiple Choice
Cognitive Process	Formulate
Proficiency Level	3

#### Description of Answer Key and Credits:

‘NO’, ‘NO’ and ‘YES’ in that order.

#### Credit Pattern:

Full Credit: 2 for correct answer

No Credit: 0 for any answer.

(ii) Find the Password.

#### Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	3

#### Description of Answer Key and Credits:

Password (4-digit number) = 3621

#### Credit Pattern:

Full Credit: 2 for Correct password

No Credit: 0 for any password

(iii) Amisha tells that the average of the digits of password is 3 times the digit in ones place  
Is she right? Justify your answer.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Connections and Reflection
Overarching Idea	Uncertainty and data
Context	Personal
Item format	Closed Constructed Response
Cognitive Process	Formulate and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

$$\text{Average} = \frac{3 + 6 + 2 + 1}{4} = 3$$

$$3 \text{ times the digit in ones place} = 3 \times 1 = 3$$

**Credit Pattern:**

Full Credit: 2 for both correct answers

Partial Credit: 1 for any one correct answer

No Credit: 0 for any other answer

(iv) Suggest another 4 digit password whose mean is 5 and the digits are in arithmetic progression.

Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

The coordinates of the vertices of the triangle formed by these lines and the y-axis are (0, 6), (2, 3) and (0, 1).



**Credit Pattern:**

Full Credit: 2 for all three correct coordinates

Partial Credit: 1 for any two correct coordinates

No Credit: 0 for any other answer

(v) Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis.

## Mathematical Literacy

Framework	Characteristics
Competency Cluster	Reflection
Overarching Idea	Change & Relationships and Quantity
Context	Public
Item format	Closed Constructed Response
Cognitive Process	Interpret and Employ
Proficiency Level	3

**Description of Answer Key and Credits:**

4- digit password whose mean is 5 and the digits are in arithmetic progression= 2468

**Credit Pattern:**

Full Credit: 2 for correct answer

No Credit: 0 for any other answer

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**CRITICAL AND CREATIVE THINKING ITEMS**

**CLASS X : CHAPTER 3 : POLYNOMIALS**

**INDEX**

<b>S.No.</b>	<b>Theme of the item</b>
21.	Water tank
22.	The peregrine falcon
23.	Donation
24.	Cyclone
25.	Gym
26.	Let's play in the park
27.	Curiosity rover
28.	Delicious and Decorative Delight
29.	Peacock's pleasure
30.	Throwing a ball
31.	Steel frame
32.	Resistors in parallel
33.	Everyday Use of Polynomials
34.	Ticket prices
35.	Making a Wooden chest

## Item 6

(6.1)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b> <b><u>Water Tank</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 15 Min.</u></b> <b><u>Total credit: 02</u></b>												
<b>Description of Item</b> <table border="1" data-bbox="220 696 632 1093"><tr><td><math>\mathbb{R}</math></td><td><b>Text</b></td></tr><tr><td></td><td><b>Image</b></td></tr><tr><td></td><td><b>Table</b></td></tr><tr><td></td><td><b>Graph</b></td></tr><tr><td></td><td><b>Map</b></td></tr><tr><td></td><td><b>Poem</b></td></tr></table>	$\mathbb{R}$	<b>Text</b>		<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<b>Learning outcome:</b> <b>(as per NCERT) .</b>  <b>Division Algorithm For Polynomials.</b>	
$\mathbb{R}$	<b>Text</b>													
	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													



A builder wants to build a sump to store water in an apartment. He planned in such a way that its base dimensions are  $(x + 1)$  and  $(x - 2)$ .

Find how much he has to dig so that the volume of the rectangular prism will be  $f(x) = x^4 + 2x^3 - 4x^2 - 7x - 2$ .

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Adaptive reasoning.
Overarching Idea	Change and relationship
Context	volume
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

### Description of Answer Key and Credits

$$x^2+3x+1$$

F.C: 02

$$(x+1)(x-2) = x^2 - x - 2$$

P.C: 01

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(6.2)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b>	<b><u>Class:X</u></b> <b><u>Expected time: 05 Min.</u></b> <b><u>Total credit: 02</u></b>												
<b>Description of Item</b> <table border="1"><tr><td><math>\mathbb{R}</math></td><td>Text</td></tr><tr><td></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td></td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table>	$\mathbb{R}$	Text		Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT).</b>  <b>Finding the value of polynomial</b>	
$\mathbb{R}$	Text													
	Image													
	Table													
	Graph													
	Map													
	Poem													

If  $x=10$  units, what is the volume of the sump.

**Mathematical Literacy**

<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
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Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Volume.
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	2

<b><u>Credit pattern :</u></b>
<b><u>Full credit:02</u></b>
<b><u>Partial credit:01</u></b>
<b><u>No credit:00</u></b>

#### Description of Answer Key and Credits

11,528 cubic units.
F.C: 02
Substituting $x = 10$
P.C: 01

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(6.3)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b>	<b><u>Class: X</u></b> <b><u>Expected time:10 Min.</u></b> <b><u>Total credit: 02</u></b>		
<b>Description of Item</b>		<b>Learning outcome:</b> <b>(as per NCERT).</b>		
<table border="1"> <tr> <td>B</td> <td>Text</td> </tr> </table>		B	Text	
B	Text			

	<b>Image</b>		<b>Finding the value of polynomial</b>
	<b>Table</b>		
	<b>Graph</b>		
	<b>Map</b>		
	<b>Poem</b>		

If  $x = 10$  and the builder wants to paint the outer portion on the sump, what is the cost of painting, if the cost of paint is Rs. 25/ per square unit.

### Mathematical Literacy

<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Surface area
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

**Description of Answer Key and Credits**

Rs. 1,24,450

F.C: 02

Area to be painted =  $2 \times 131 \times 19$  square units

P.C: 01

11 528 cubic units

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(6.4)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 05 Min.</u></b> <b><u>Total credit: 02</u></b>												
<b>Description of Item</b> <table border="1"><tr><td></td><td>Text</td></tr><tr><td></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td></td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table>		Text		Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT).</b>  <b>Finding the value of polynomial</b>	
	Text													
	Image													
	Table													
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	Poem													

If the builder wants to close the sump, what is the cost of painting?

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Surface area
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

**Description of Answer Key and Credits**

Rs. 1,26,650

F.C: 02

Area to be painted = 5066 square units

P.C: 01

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


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**Item 7.**

(7.1)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b> The peregrine falcon	<b><u>Class: X</u></b> <b><u>Expected time:10 Min.</u></b> <b><u>Total credit: 02</u></b>												
<b>Description of Item</b> <table border="1"><tr><td></td><td>Text</td></tr><tr><td></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td></td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table>		Text		Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT).</b>  Finding the zeroes of polynomials.	
	Text													
	Image													
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	Graph													
	Map													
	Poem													

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Soaring high above a rugged canyon or a city street, a peregrine falcon spots its prey. The falcon accelerates, then transforms its body into the shape of a speeding bullet by pointing its head down and tucking in its wings and feet. Within seconds of beginning its dive, called a stoop, the peregrine falcon can reach speeds of up to 217 miles per hour.

The peregrine falcon is as much “at home” in the high-rise buildings of the city as it is in the cliffs and mountains. A special program designed to save this bird from extinction has helped it adapt to city life.

About the same size as a crow, peregrine falcons are predators with streamlined bodies and long, pointed wings. The falcon’s wings are strong enough to give it the power to carry its prey back to a nest in the cliffs or a top a high-rise city building. But the specialized wings of this falcon provide more than just strength. They also enable the peregrine falcon to claim the title of the fastest-moving animal on the earth.

Suppose that the height, in feet, of a peregrine falcon  $t$  seconds after it starts diving toward its prey is modelled by the quadratic function  $h(t) = -16t^2 - 20t + 1000$ .

If the falcon is on 500ft tall building, how long it will take to reach to the prey?

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Solving a quadratic equation
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	3

**Description of Answer Key and Credits**

FULL CREDIT: 02

$$500 = -16t^2 - 20t + 1000$$

$$16t^2 + 20t - 500 = 0 \quad t = 5 \text{ sec}$$

PARTIAL CREDIT: 01

Any one step from above

NO CREDIT

No response or any other response

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(7.2)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b>	<b><u>Class: X</u></b>
		<b><u>Expected time: 05 Min.</u></b>

		<b><u>Total credit: 02</u></b>												
<b>Description of Item</b>  <table border="1"> <tr><td><i>R</i></td><td>Text</td></tr> <tr><td></td><td>Image</td></tr> <tr><td></td><td>Table</td></tr> <tr><td></td><td>Graph</td></tr> <tr><td></td><td>Map</td></tr> <tr><td></td><td>Poem</td></tr> </table>	<i>R</i>	Text		Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT).</b>  <b>Finding the value of polynomial</b>	
	<i>R</i>	Text												
		Image												
		Table												
		Graph												
		Map												
		Poem												

If the time taken by falcon is 6seconds.Find the height of the building?

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Substitution.
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	2

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

**Description of Answer Key and Credits**

FULL CREDIT

$$-16t^2 - 20t + 1000. \quad t=6$$

$$-16(6)^2 - 20(6) + 1000 = -16(36) - 120 + 1000 = 304\text{ft}$$

PARTIAL CREDIT

SUBSTITUTING FOR t = 6

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## **Item 8**

(8.1)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: Polynomials</u></b>  <b><u>Donation</u></b>	<b><u>Class: X</u></b>  <b><u>Expected time:1 Min.</u></b>  <b><u>Total credit: 02</u></b>												
<b>Description of Item</b>  <table border="1"><tr><td></td><td><b>Text</b></td></tr><tr><td></td><td><b>Image</b></td></tr><tr><td></td><td><b>Table</b></td></tr><tr><td></td><td><b>Graph</b></td></tr><tr><td></td><td><b>Map</b></td></tr><tr><td></td><td><b>Poem</b></td></tr></table>		<b>Text</b>		<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<b>Learning outcome:</b> <b>(as per NCERT).</b>  <b>Finding the zeroes of polynomials.</b>	
	<b>Text</b>													
	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

Two sisters Sonu and Meenu were having a land, so they decided to donate 5% of their land to an orphanage. The orphanage is planning to build a building in the land which is in a shape of a rectangle whose length is five meters more than its breadth. Both the sisters agreed to give their land whole heartedly. The area of their land is 1000 square meter.

Question:

Find the dimensions of the land given to the orphanage?

## Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Percentage and area.
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

### Description of Answer Key and Credits

Area of the land given to the orphanage=5% of the whole land

$$=5\% \text{ of } 1000$$

$$=\frac{5}{100} \times 1000$$

$$=50\text{sq.m}$$

Area of the rectangle= l x b

$$(b+5) \times b=50$$

$$b=5\text{m}$$

F.C: Therefore, l=10m and b=5m

P.C: 01

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**Item 9**

(9.1)

<p><b><u>Domain: Mathematics literacy</u></b></p>	<p><b><u>Theme: Polynomials</u></b>   <b><u>Cyclone</u></b></p>	<p><b><u>Class: X</u></b>   <b><u>Expected time:10 Min.</u></b>   <b><u>Total credit: 02</u></b></p>				
<p><b>Description of Item</b></p> <table border="1" data-bbox="220 1939 632 2074"> <tr> <td data-bbox="220 1939 427 2007">R</td> <td data-bbox="427 1939 632 2007">Text</td> </tr> <tr> <td data-bbox="220 2007 427 2074"></td> <td data-bbox="427 2007 632 2074">Image</td> </tr> </table>	R	Text		Image	<p><b>Learning outcome:</b>  <b>(as per NCERT).</b>   <b>Finding the value of polynomial</b></p>	
R	Text					
	Image					



	<b>Table</b>		
	<b>Graph</b>		
	<b>Map</b>		
	<b>Poem</b>		

Due to cyclone, an old tree in Shyam’s garden fell down but as his grandfather insisted, the family tried to support the tree with a wire to make it upright. The tree was supported by a wire anchored to the ground 5 feet from its base. The wire is 1 foot longer than the height of the tree.

1).Find the length of the wire

**Mathematical Literacy**

<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency cluster	Conceptual understanding
Overarching Idea	Change and relationship
Context	Pythagorean’s Theorem.
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.
Proficiency Level	2

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:00**

**Description of Answer Key and Credits**

FC	13 feet
PC	if the equation is framed $(x+1)^2 = x^2 + 5^2$
NC	any other answer

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


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Name of the vidyalaya: no1, OE, Trichy

KVS Region: Chennai

**Item 10**

(10.1)

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme:</u> Polynomials  <u>Gym</u></b>	<b><u>Class: X</u></b>  <b><u>Expected time: 05 Min.</u></b>  <b><u>Total credit: 02</u></b>												
<b>Description of Item</b>  <table border="1" data-bbox="220 790 632 1184"> <tr><td></td><td>Text</td></tr> <tr><td></td><td>Image</td></tr> <tr><td></td><td>Table</td></tr> <tr><td></td><td>Graph</td></tr> <tr><td></td><td>Map</td></tr> <tr><td></td><td>Poem</td></tr> </table>			Text		Image		Table		Graph		Map		Poem	<b>Learning outcome:</b>  <b>(as per NCERT).</b>  <b>Finding the zeroes of polynomials.</b>
	Text													
	Image													
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	Graph													
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	Poem													

Raj, a student of class vii got inspired to be a gymnast after watching the Olympic Games. He immediately joined an academy and started to work hard. During his practice sessions, it was observed that Raj dismounted the uneven parallel bars. His height  $h$ , depends on the time  $t$ , that he is in the air as follows:

$$h = -16t^2 + 8t + 8. \text{ How long will it take Raj to reach the ground?}$$

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	Adaptive reasoning
Overarching Idea	Change and relationship
Context	Scientific
Item Format	<b>Short response item</b>
Cognitive process	Problem solving.

Proficiency Level	3
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<b><u>Credit pattern :</u></b>
<b><u>Full credit:02</u></b>
<b><u>Partial credit:01</u></b>
<b><u>No credit:00</u></b>

**Description of Answer Key and Credits**

FC	1 second
PC	$-16t^2 + 8t + 8 = 0$

Name of the Teacher/Item Writer: S.JAYARAMAN

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Phone No: 9427523022

Name of the vidyalaya: no1, OE, Trichy

KVS Region: Chennai

<p align="center"><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p> <p align="center"><b><u>CONTEXT : 11-1</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 3 minutes</u></b></p> <p align="center"><b><u>Total credit:02</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 479 603 869"> <tr><td align="center">B</td><td><b>Text</b></td></tr> <tr><td align="center">B</td><td><b>Image</b></td></tr> <tr><td></td><td><b>Table</b></td></tr> <tr><td></td><td><b>Graph</b></td></tr> <tr><td></td><td><b>Map</b></td></tr> <tr><td></td><td><b>Poem</b></td></tr> </table>	B	<b>Text</b>	B	<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b></p> <p><b>(as per NCERT)</b></p> <p>Students are expected to identify the nature of a polynomial function.</p>	
B	<b>Text</b>													
B	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

### 11.1.Let's play in the park



11. The picture represents a park with a garden in the middle of it and pathway around. The dimension of the garden is 6 m x 4 m such that there is a pathway around with even width x.

11.1. Write the polynomial expression which represents the area of the park.

## Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	SPACE AND SHAPE
Context	Societal
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 2

### Credit pattern :

Full credit:02

Partial credit:01

No credit:0

### Description of Answer Key and Credits

Full credit: 2 ,  $4x^2+20x+24$  OR  $4(x^2+5x+6)$  Partial credit:1,  $(6+2x)(4+2x)$   
No credit: For any other response

Name of the Teacher/Item Writer:K.Ganesan

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Phone No:9444666889

Name of the Vidyalaya: AFS Avadi Chennai-55

KVS Region: Chennai

<p align="center"><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p> <p align="center"><b><u>CONTEXT : 11-1</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 3 minutes</u></b></p> <p align="center"><b><u>Total credit:02</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 479 603 860"> <tr> <td align="center">R</td> <td><b>Text</b></td> </tr> <tr> <td align="center">R</td> <td><b>Image</b></td> </tr> <tr> <td></td> <td><b>Table</b></td> </tr> <tr> <td></td> <td><b>Graph</b></td> </tr> <tr> <td></td> <td><b>Map</b></td> </tr> <tr> <td></td> <td><b>Poem</b></td> </tr> </table>	R	<b>Text</b>	R	<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b></p> <p><b>(as per NCERT)</b></p> <p>Students are expected to identify the nature of a polynomial function.</p>	
R	<b>Text</b>													
R	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

## 11.2. Let's play in the park



11.2 The picture represents a park with a garden in the middle of it and pathway around. The dimension of the garden is 6 m x 4 m such that there is a pathway around with even width. The area of the pathway is equal to the area of garden. What would be the width of the path?

## Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	SPACE AND SHAPE
Context	Societal
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 2

### Credit pattern :

**Full credit:02**

**Partial credit:01**

**No credit:0**

### **Description of Answer Key and Credits**

Full credit: 2 , 1 metre Partial credit:0  
No credit: For any other response

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KVS Region: Chennai



<p><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b> <b><u>CONTEXT : 11-1</u></b></p>	<p><b><u>Class: X</u></b> <b><u>Expected time: 3 minutes</u></b> <b><u>Total credit:02</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 526 568 925"> <tr> <td data-bbox="193 526 376 593">R</td> <td data-bbox="376 526 568 593">Text</td> </tr> <tr> <td data-bbox="193 593 376 660">R</td> <td data-bbox="376 593 568 660">Image</td> </tr> <tr> <td data-bbox="193 660 376 728"></td> <td data-bbox="376 660 568 728">Table</td> </tr> <tr> <td data-bbox="193 728 376 795"></td> <td data-bbox="376 728 568 795">Graph</td> </tr> <tr> <td data-bbox="193 795 376 862"></td> <td data-bbox="376 795 568 862">Map</td> </tr> <tr> <td data-bbox="193 862 376 925"></td> <td data-bbox="376 862 568 925">Poem</td> </tr> </table>	R	Text	R	Image		Table		Graph		Map		Poem	<p><b>Learning outcome:</b> <b>(as per NCERT)</b></p> <p>Students are expected to identify the nature of a polynomial function.</p>	
R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

## 12.1.CURIOSITY ROVER



12.A piece of metal on one of the mastcams of the rover has a surface area that's represented by  $x^2 - x - 2$  in square millimetres. If the width of the piece of metal is  $x + 3$  millimetres.

12.1. Write an expression to find the length of the piece of metal.

## Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Formulating
Overarching Idea	SPACE AND SHAPE
Context	Scientific
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 2

### Credit pattern :

Full credit:02

Partial credit:01

No credit:0

### Description of Answer Key and Credits

Full credit: 2,  $\text{length}=\text{area} / \text{width}=(x^2 - x - 2)/(x+3),$

Partial credit:  $\text{length}=\text{area} / \text{width}$ No credit: For any other response

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Name of the Vidyalaya:CLRIAdayar, Chennai-20

KVS Region: Chennai

<p><b><u>Domain: Mathematics literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b></p> <p><b><u>CONTEXT : 11-1</u></b></p>	<p><b><u>Class: X</u></b></p> <p><b><u>Expected time: 3 minutes</u></b></p> <p><b><u>Total credit:02</u></b></p>												
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R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

## 12.2.CURIOSITY ROVER



12. A piece of metal on one of the mastcams of the rover has a surface area that's represented by  $x^2 + 7x + 12$  in square millimetres. If the width of the piece of metal is  $(x+3)$  millimetres.

12.2. What is the length of the mastcam.

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Formulating
Overarching Idea	SPACE AND SHAPE
Context	Scientific
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 2

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:0**

**Description of Answer Key and Credits**

Full credit:  $(x+4)$ , Partial credit: 0

No credit: For any other response

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Name of the Vidyalaya: CLRI Adayar, Chennai-20

KVS Region: Chennai

<p><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b> <b><u>CONTEXT : 11-1</u></b></p>	<p><b><u>Class: X</u></b> <b><u>Expected time: 3 minutes</u></b> <b><u>Total credit:02</u></b></p>												
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R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

### 13.1.Delicious and Decorative Delight



13. A new bakery offers decorated sheet cakes for parties and other occasions. The bakery wants the volume of a small cake to be 351 cubic inches. The cake is in the shape of a rectangular solid. The length of the cake is 4 inches longer than the width and height of the cake is  $\frac{1}{3}$ rd of the width.

13.1. Write a polynomial expression representing the volume.

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Formulating
Overarching Idea	SPACE AND SHAPE
Context	Occupational
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:0**

**Description of Answer Key and Credits**

Full credit:  $(x^3+4x^2=1053)$ , Partial credit: 0

No credit: For any other response

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Name of the Vidyalaya: CLRI Adayar, Chennai-20

KVS Region: Chennai

<p><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b></p> <p><b><u>CONTEXT : 11-1</u></b></p>	<p><b><u>Class: X</u></b></p> <p><b><u>Expected time: 3 minutes</u></b></p> <p><b><u>Total credit:02</u></b></p>												
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R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

13. A new bakery offers decorative

## 13. 2.Delicious and Decorative Delight

ated sheet cakes for parties and other occasions. The bakery wants the volume of a small cake to be 351 cubic inches. The cake is in the shape of a rectangular solid. The length of the cake is 4 inches longer than the width and height of the cake is  $\frac{1}{3}$ rd of the width.

13.2. What are the dimensions of the cake?.





### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Formulating
Overarching Idea	SPACE AND SHAPE
Context	Occupational
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:0**

### Description of Answer Key and Credits

Full credit: 13 inches x 9 inches x3 inches, Partial credit: 0

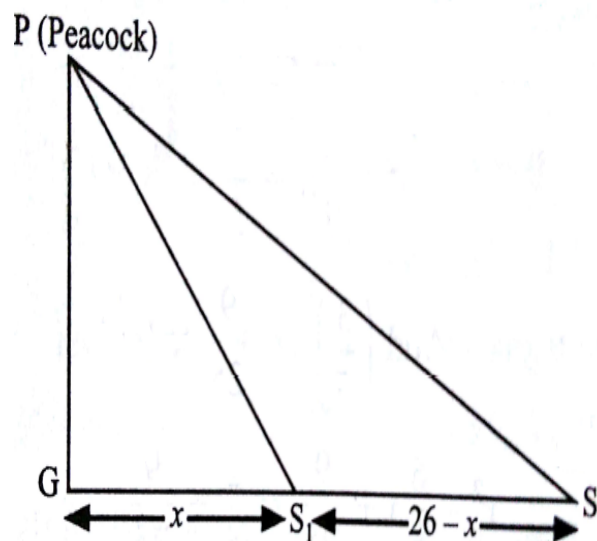
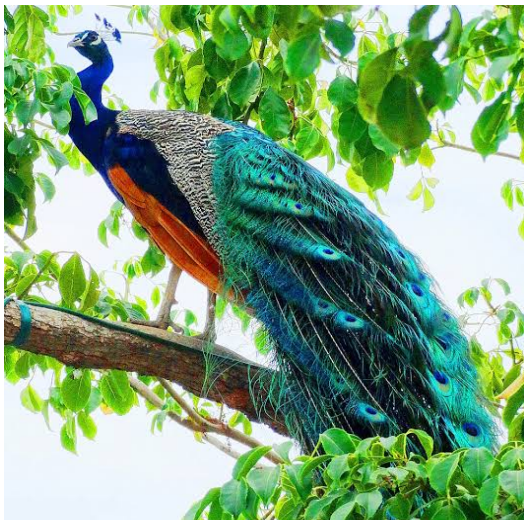
No credit: For any other response



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Email:barathisankar2016@gmail.com  
Phone No:8146157391  
Name of the Vidyalaya: CLRI Adyar, Chennai-20  
KVS Region: Chennai

<p><b>Domain: Mathematics</b> <b>literacy</b></p>	<p><b>Theme:POLYNOMIALS</b></p> <p><b>CONTEXT : 11-1</b></p>	<p><b>Class: X</b></p> <p><b>Expected time: 3 minutes</b></p> <p><b>Total credit:02</b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 524 564 916"> <tr> <td data-bbox="193 524 373 591">P</td> <td data-bbox="373 524 564 591">Text</td> </tr> <tr> <td data-bbox="193 591 373 658">P</td> <td data-bbox="373 591 564 658">Image</td> </tr> <tr> <td data-bbox="193 658 373 725"></td> <td data-bbox="373 658 564 725">Table</td> </tr> <tr> <td data-bbox="193 725 373 792"></td> <td data-bbox="373 725 564 792">Graph</td> </tr> <tr> <td data-bbox="193 792 373 860"></td> <td data-bbox="373 792 564 860">Map</td> </tr> <tr> <td data-bbox="193 860 373 916"></td> <td data-bbox="373 860 564 916">Poem</td> </tr> </table>	P	Text	P	Image		Table		Graph		Map		Poem	<p><b>Learning outcome:</b></p> <p><b>(as per NCERT)</b></p> <p>Students are expected to identify the nature of a polynomial function.</p>	
P	Text													
P	Image													
	Table													
	Graph													
	Map													
	Poem													

## 14. 1.Peacock's Pleasure



14. A peacock is sitting on the top of a tree which is 10 m high. A rat's burrow at the bottom of the tree. A snake is coming from a distance of 26m horizontally from the burrow towards rat. Seeing the snake the peacock pounces upon it.

14.1. Considering S and S1 as the initial and final positions of snake (from the diagram), form an expression for the time taken for the snake to be caught if their speeds are same.

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	SPACE AND SHAPE
Context	SCIENTIFIC
Item Format	Short Answer type
Cognitive process	Interpreting
Proficiency Level	Level 3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:0**

**Description of Answer Key and Credits**

Full credit:  $2\sqrt{x^2 + 100} = 28 - x$

Partial credit:0

No credit: For any other response

Name of the Teacher/Item Writer:K.Ganesan

Designation:TGT(Maths)

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Phone No:9444666889

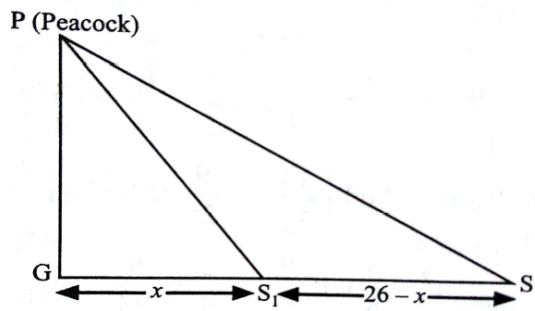
Name of the Vidyalaya: AFS Avadi Chennai-55

KVS Region: Chennai

<p><b><u>Domain: Mathematics literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b></p> <p><b><u>CONTEXT : 11-1</u></b></p>	<p><b><u>Class: X</u></b></p> <p><b><u>Expected time: 3 minutes</u></b></p> <p><b><u>Total credit:02</u></b></p>											
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 1496 564 1883"> <tr> <td data-bbox="193 1496 373 1563">R</td> <td data-bbox="373 1496 564 1563">Text</td> </tr> <tr> <td data-bbox="193 1563 373 1630">R</td> <td data-bbox="373 1563 564 1630">Image</td> </tr> <tr> <td data-bbox="193 1630 373 1697"></td> <td data-bbox="373 1630 564 1697">Table</td> </tr> <tr> <td data-bbox="193 1697 373 1765"></td> <td data-bbox="373 1697 564 1765">Graph</td> </tr> <tr> <td data-bbox="193 1765 373 1832"></td> <td data-bbox="373 1765 564 1832">Map</td> </tr> <tr> <td data-bbox="193 1832 373 1883"></td> <td data-bbox="373 1832 564 1883">Poem</td> </tr> </table>	R	Text	R	Image		Table		Graph		Map		Poem	<p><b>Learning outcome:</b></p> <p><b>(as per NCERT)</b></p> <p>Students are expected to identify the nature of a polynomial function.</p>
R	Text												
R	Image												
	Table												
	Graph												
	Map												
	Poem												

## 14.2.Peacock's Pleasure





14. A peacock is sitting on the top of a tree which is 10 m high. A rat's burrow at the bottom of the tree. A snake is coming from a distance of 26m horizontally from the burrow towards rat. Seeing the snake the peacock pounces upon it.

14.2. If their speeds are equal, at what distance from the hole the snake is caught?

### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	Conceptual understanding
Overarching Idea	CHANGE AND RELATIONSHIP
Context	SCIENTIFIC
Item Format	Short Answer type
Cognitive process	Interpreting

Proficiency Level

Level 3

**Credit pattern :**

**Full credit:02**

**Partial credit:01**

**No credit:0**

**Description of Answer Key and Credits**

Full credit: 2 , 11.08 metre (approx.) Partial credit:0

No credit: For any other response

Name of the Teacher/Item Writer:K.Ganesan

Designation:TGT(Maths)

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Phone No:9444666889

Name of the Vidyalaya: AFS Avadi Chennai-55







KVS Region: Chennai

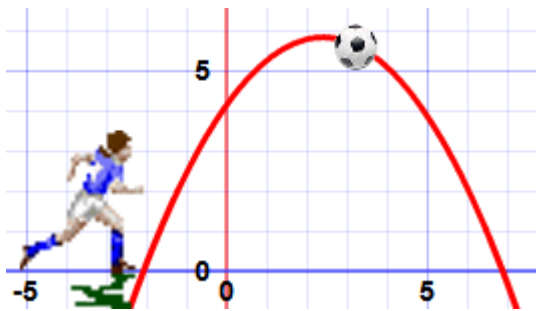
**Domain: Mathematics**  
**literacy**

**Theme:POLYNOMIALS**

**Class: X**

**Expected time:**

		<b><u>3minutes</u></b> <b><u>Total credit: 2</u></b>											
<b>Description of Item</b>	<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial												
<table border="1"> <tr><td></td><td><b>Text</b></td></tr> <tr><td></td><td><b>Image</b></td></tr> <tr><td></td><td><b>Table</b></td></tr> <tr><td></td><td><b>Graph</b></td></tr> <tr><td></td><td><b>Map</b></td></tr> <tr><td></td><td><b>Poem</b></td></tr> </table>		<b>Text</b>		<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	
	<b>Text</b>												
	<b>Image</b>												
	<b>Table</b>												
	<b>Graph</b>												
	<b>Map</b>												
	<b>Poem</b>												



**Item : (27) Throwing a ball**

27.1 A ball is thrown straight up, from 3 m above the ground, with a velocity of 14 m/s. Gravity pulls it down, changing its position by *about* 5 m per second squared Ignoring air resistance, find out its height (h) by adding up these three things and Form a quadratic Polynomial in t.

**Mathematical Literacy**

<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
Competency cluster	formulating situations mathematically
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Description of Answer Key and Credits**

**Full credit: 02**  $h = 3 + 14t - 5t^2$

**Partial credit: 01** writing any two terms correctly

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Phone No:9445646533Name of the Vidyalaya: KV CLRI CHENNAIKVS Region: Chennai

<b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 3 minutes</u></b> <b><u>Total credit: 2</u></b>												
<b>Description of Item</b>  <table border="1" style="width: 100%;"> <tr><td style="text-align: center;">R</td><td style="text-align: center;">Text</td></tr> <tr><td style="text-align: center;">R</td><td style="text-align: center;">Image</td></tr> <tr><td></td><td style="text-align: center;">Table</td></tr> <tr><td></td><td style="text-align: center;">Graph</td></tr> <tr><td></td><td style="text-align: center;">Map</td></tr> <tr><td></td><td style="text-align: center;">Poem</td></tr> </table>	R	Text	R	Image		Table		Graph		Map		Poem	<b>Learning outcome:</b>  <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial	
R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

27.2 Find the zeroes of the polynomial  $3+14t - 5t^2$  and also find when the ball hits the ground

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02** t = 3 seconds

**Partial credit: 01** t = -0.2 or t= 3

**No credit: 00** :other response / no response



<p align="center"><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 3 minutes</u></b></p> <p align="center"><b><u>Total credit: 2</u></b></p>												
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R	<b>Text</b>													
R	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

27.3 Find the maximum height the ball reaches?

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02 Maximum** height  $h = 13\text{m}$  (approx.)

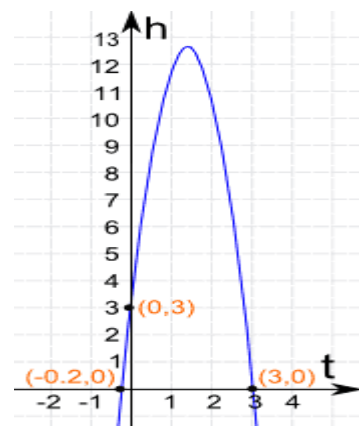
**Partial credit: 01** just substituting.  $t = 1.5$

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 1 minute</u></b> <b><u>Total credit: 2</u></b>
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Description of Item		Learning outcome:  (as per NCERT)  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial
$\mathbb{R}$	Text	
	Image	
	Table	
$\mathbb{R}$	Graph	
	Map	
	Poem	

27.4 Mention the name of the graph in the given figure



### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	2

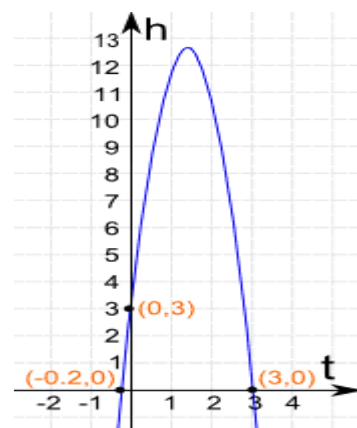
**Full credit: 02** Parabola

**Partial credit: -----**

**No credit: 00** :other response / no response

<p align="center"><b><u>Domain: Mathematics literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 1 minute</u></b></p> <p align="center"><b><u>Total credit: 2</u></b></p>												
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$\mathbb{R}$	<b>Text</b>													
	<b>Image</b>													
	<b>Table</b>													
$\mathbb{R}$	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

27.5 Find the maximum height of the ball reaches the space from the graph without calculation



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02** Max height  $h = 13\text{m}$  ( between 12 and 13 )

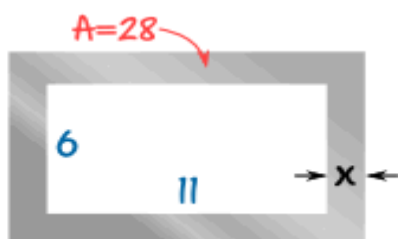
**Partial credit: -----**

**No credit: 00** :other response / no response

<b>Domain: Mathematics</b> <b>literacy</b>	<b>Theme: POLYNOMIALS</b>	<b>Class: X</b> <b>Expected time: 3 minutes</b> <b>Total credit: 2</b>												
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$\mathbb{R}$	Text													
$\mathbb{R}$	Image													
	Table													
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	Map													
	Poem													

### Item (28) Steel Frame







Amit's company is going to make frames as part of a new product they are launching. The frame will be cut out of a piece of steel, and to keep the weight down, the final area should be **28 cm<sup>2</sup>**. The inside of the frame has to be **11 cm by 6 cm**.



**281** What is the Polynomial of the area of steel before cutting and also write the degree of the polynomial obtained?

**Mathematical Literacy**

<b>FRAMEWORK</b>	<b>CHARACTERISTICS</b>
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<p><b>Description of Item</b></p> <table border="1"> <tr> <td></td> <td><b>Text</b></td> </tr> <tr> <td></td> <td><b>Image</b></td> </tr> <tr> <td></td> <td><b>Table</b></td> </tr> <tr> <td></td> <td><b>Graph</b></td> </tr> <tr> <td></td> <td><b>Map</b></td> </tr> <tr> <td></td> <td><b>Poem</b></td> </tr> </table>		<b>Text</b>		<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b> <b>(as per NCERT)</b></p> <p>The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial</p>
		<b>Text</b>											
		<b>Image</b>											
		<b>Table</b>											
		<b>Graph</b>											
		<b>Map</b>											
		<b>Poem</b>											

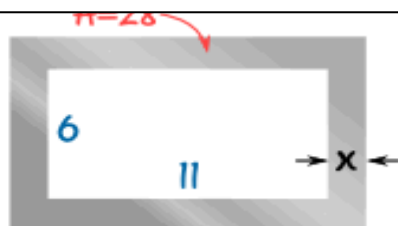
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02**  $4x^2 + 34x + 66$  and degree is 2

**Partial credit: 01**  $(2x + 11)(2x + 6)$

**No credit: 00** :other response / no response

× 6 middle



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	2

**Full credit: 02**  $x=0$  and  $x = \frac{-17}{2}$

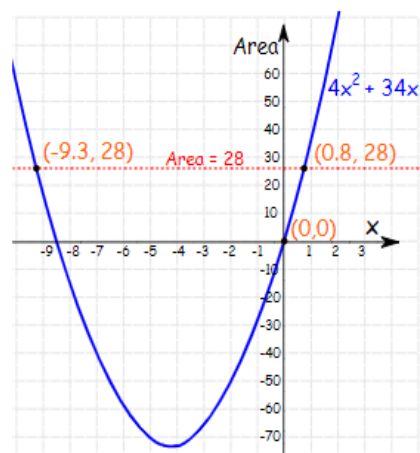
**Partial credit: 01**  $4x^2 + 34x$

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time:1 minute</u></b> <b><u>Total credit: 2</u></b>
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<b>Description of Item</b>		<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial
R	<b>Text</b>	
R	<b>Image</b>	
	<b>Table</b>	
R	<b>Graph</b>	
	<b>Map</b>	
	<b>Poem</b>	

28.3 From the graph find the value of x.



### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02**  $x=0$  and  $x = \frac{-17}{2}$

**Partial credit: 01**  $x = 0$

**No credit: 00** :other response / no response



<p><b><u>Domain: Mathematics literacy</u></b></p>	<p><b><u>Theme:POLYNOMIALS</u></b></p>	<p><b><u>Class: X</u></b> <b><u>Expected time:1 minute</u></b> <b><u>Total credit: 2</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 741 603 1135"> <tr><td><math>\mathbb{R}</math></td><td>Text</td></tr> <tr><td><math>\mathbb{R}</math></td><td>Image</td></tr> <tr><td></td><td>Table</td></tr> <tr><td></td><td>Graph</td></tr> <tr><td></td><td>Map</td></tr> <tr><td></td><td>Poem</td></tr> </table>	$\mathbb{R}$	Text	$\mathbb{R}$	Image		Table		Graph		Map		Poem	<p><b>Learning outcome:</b> <b>(as per NCERT)</b></p> <p>The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial</p>	
$\mathbb{R}$	Text													
$\mathbb{R}$	Image													
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	Graph													
	Map													
	Poem													

28.4 If  $x = 5$  inches then the area of steel before cutting is \_\_\_\_\_



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

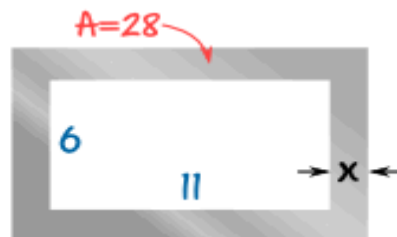
**Full credit: 02** 336 square inches

**Partial credit: 01** for sub. the value

**No credit: 00** :other response / no response

<b>Domain: Mathematics literacy</b>	<b>Theme: POLYNOMIALS</b>	<b>Class: X</b> <b>Expected time: 3 minutes</b> <b>Total credit: 2</b>												
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	Graph													
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28.5 Find the perimeter of the steel frame in the given diagram.



### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts

Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02**  $8x + 68$

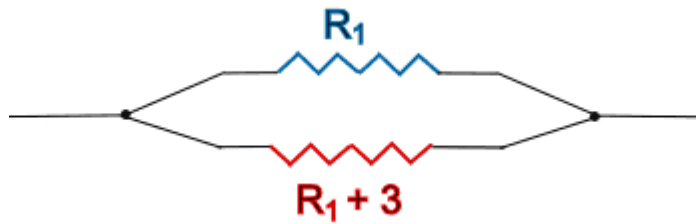
**Partial credit: 01**  $2(2x+11+2x + 6) + 2 \times 17$

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b>  <b><u>Expected time: 3 minutes</u></b>  <b><u>Total credit: 2</u></b>												
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$\frac{R}{2}$	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
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	<b>Poem</b>													

### Item (29) Resistors In Parallel

Two resistors are in parallel, like in this diagram:



The total resistance has been measured at 2 Ohms, and one of the resistors  $R_2$  is known to be 3 ohms more than the other. The formula to work out total resistance " $R_T$ " is:  $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2}$

29.1 What is the relation between  $R_1$  and  $R_2$  If  $R_2$  is 7Ohms what is  $R_1$

#### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02**  $R_2 = R_1 + 3$  and  $R_1 = 4$  ohms

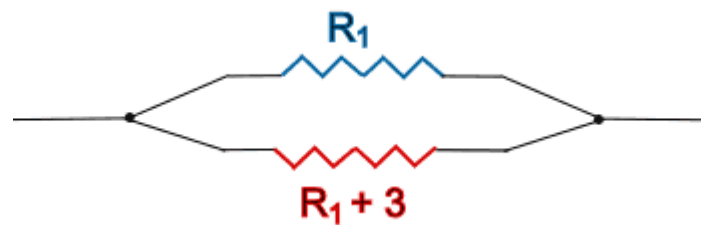
**Partial credit: 01**

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b>	<b><u>Theme: POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 3 minutes</u></b> <b><u>Total credit: 2</u></b>
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Description of Item		Learning outcome: (as per NCERT)
$R_1$	Text	The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial
$R_1$	Image	
	Table	
	Graph	
	Map	
	Poem	

29.2 Form a Quadratic equation in  $R_1$ .



#### Mathematical Literacy

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

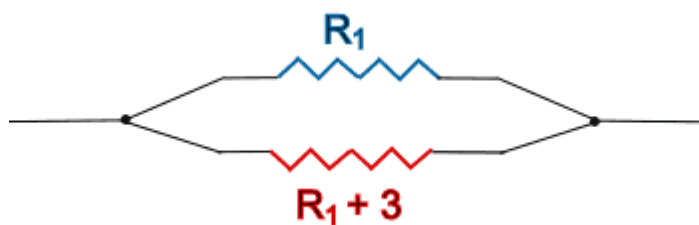
**Full credit: 02**  $x^2 - x - 6 = 0$  where  $x = R_1$

**Partial credit: 01**  $\frac{1}{2} = \frac{1}{x} + \frac{1}{x+3}$

**No credit: 00** :other response / no response

<p align="center"><b><u>Domain: Mathematics literacy</u></b></p>	<p align="center"><b><u>Theme: POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 3 minutes</u></b></p> <p align="center"><b><u>Total credit: 2</u></b></p>												
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$\mathbb{R}$	Text													
$\mathbb{R}$	Image													
	Table													
	Graph													
	Map													
	Poem													

29.3 What are the values of the two resistors?



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02**  $R_1 = 3$  and  $R_2 = 6$

**Partial credit: 01**  $R_1 = 3$  or  $R_1 = -2$

**No credit: 00** :other response / no response

<b>Domain: Mathematics literacy</b>	<b>Theme: POLYNOMIALS</b>	<b>Class: X</b> <b>Expected time: 1 minute</b> <b>Total credit: 2</b>												
<b>Description of Item</b> <table border="1"><tr><td><math>R</math></td><td>Text</td></tr><tr><td><math>R</math></td><td>Image</td></tr><tr><td></td><td>Table</td></tr><tr><td></td><td>Graph</td></tr><tr><td></td><td>Map</td></tr><tr><td></td><td>Poem</td></tr></table>	$R$	Text	$R$	Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial	
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$R$	Image													
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	Graph													
	Map													
	Poem													

**Item (30) : Everyday Use of Polynomials**



Elena Mary Sai Keerthi, Michael, and David enjoy roller CoastersInnQueens Land at Chennai. Whenever a new roller Coaster opens near their town, they try to be among the first to ride. One Saturday, the four friends decide to ride a new coaster. While waiting in line, Elena Marry notices that part of this coaster resembles the graph of a polynomial function that they have been studying in their IX class.

30.1 The brochure for the coaster says that, for the first 10 seconds of the ride, the height of the coaster can be determined by  $h(t) = 0.3t^3 - 5t^2 + 21t$ , where  $t$  is the time in seconds and  $h$  is the height in feet. Classify this polynomial by degree and by number of terms.

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02** Cubic Trinomial

**Partial credit: 01** Cubic or Trinomial (any one)

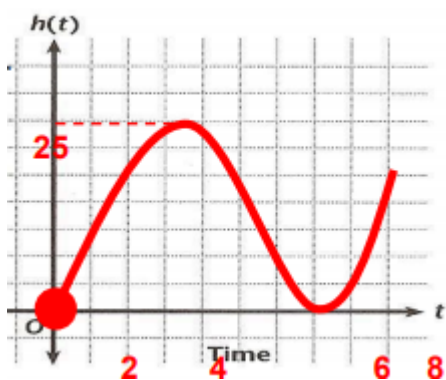
**No credit: 00** :other response / no response

<b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time:1 minutes</u></b> <b><u>Total credit: 2</u></b>								
<b>Description of Item</b>	<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial									
<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">R</td> <td style="text-align: center;">Text</td> </tr> <tr> <td style="text-align: center;">R</td> <td style="text-align: center;">Image</td> </tr> <tr> <td></td> <td style="text-align: center;">Table</td> </tr> <tr> <td></td> <td style="text-align: center;">Graph</td> </tr> </table>	R	Text	R	Image		Table		Graph		
R	Text									
R	Image									
	Table									
	Graph									



	Map	
	Poem	

30.2 Graph the polynomial function for the height of the roller coaster on the coordinate plane at the right. From the graph, find the maximum height of the roller coaster



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	1

**Full credit: 02** 25 feet

**Partial credit: 01** -----

**No credit: 00** :other response / no response

<p align="center"><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b> <b><u>Expected time:2 minutes</u></b> <b><u>Total credit: 2</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 678 603 1061"> <tr><td align="center">R</td><td><b>Text</b></td></tr> <tr><td align="center">R</td><td><b>Image</b></td></tr> <tr><td></td><td><b>Table</b></td></tr> <tr><td></td><td><b>Graph</b></td></tr> <tr><td></td><td><b>Map</b></td></tr> <tr><td></td><td><b>Poem</b></td></tr> </table>	R	<b>Text</b>	R	<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b> <b>(as per NCERT)</b></p> <p>The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial</p>	
R	<b>Text</b>													
R	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

30.3 Find the height of the coaster at  $t = 0$  seconds. Explain why this answer makes sense.

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	2

**Full credit: 02**  $h(0) = 0$  This means that the ride starts on the ground

**Partial credit: 01**  $h(0) = 0$

**No credit: 00** :other response / no response

<p align="center"><b><u>Domain: Mathematics</u></b> <b><u>literacy</u></b></p>	<p align="center"><b><u>Theme:POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b> <b><u>Expected time:3 minutes</u></b> <b><u>Total credit: 2</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 1122 603 1503"> <tr><td align="center">R</td><td><b>Text</b></td></tr> <tr><td align="center">R</td><td><b>Image</b></td></tr> <tr><td></td><td><b>Table</b></td></tr> <tr><td></td><td><b>Graph</b></td></tr> <tr><td></td><td><b>Map</b></td></tr> <tr><td></td><td><b>Poem</b></td></tr> </table>	R	<b>Text</b>	R	<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b> <b>(as per NCERT)</b></p> <p>The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial</p>	
R	<b>Text</b>													
R	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

30.4 Find the height of the coaster 9 seconds after the ride begins. Explain how you found the answer.

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer

Cognitive process	Skill
Proficiency Level	3

**Full credit: 02** The answer is 2.7 feet found by substituting  $x = 9$  in the equation

**Partial credit: 01** just substitution

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time:3 minutes</u></b> <b><u>Total credit: 2</u></b>												
<b>Description of Item</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">R</td> <td style="text-align: center;">Text</td> </tr> <tr> <td style="text-align: center;">R</td> <td style="text-align: center;">Image</td> </tr> <tr> <td></td> <td style="text-align: center;">Table</td> </tr> <tr> <td></td> <td style="text-align: center;">Graph</td> </tr> <tr> <td></td> <td style="text-align: center;">Map</td> </tr> <tr> <td></td> <td style="text-align: center;">Poem</td> </tr> </table>	R	Text	R	Image		Table		Graph		Map		Poem	<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial	
R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

30.5 Evaluate  $h(60)$ . Does this answer make sense?

Identify practical (valid real life) domain of the ride for this model. CLEARLY EXPLAIN your reasoning. (Hint.: Mt. Everest is 29,028 feet tall.)

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02**  $h(60) = 48,060$  feet the answer is not reasonable, because it is too high for a roller coaster ride. On the graph, after 10 seconds, ride keeps increasing in height to infinity, therefore practical domain is no more than  $D: 0 \leq x \leq 12$

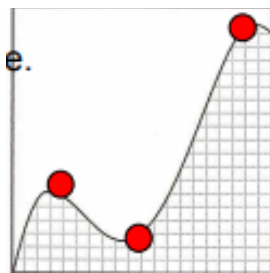
**Partial credit: 01**  $h(60) = 48,060$

**No credit: 00** :other response / no response

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme: POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time: 3 minutes</u></b> <b><u>Total credit: 2</u></b>
--	----------------------------------	---

<b>Description of Item</b>		<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial
R	<b>Text</b>	
R	<b>Image</b>	
	<b>Table</b>	
R	<b>Graph</b>	
	<b>Map</b>	
	<b>Poem</b>	

30.6 Next weekend, Elena Mary, Sai Keerthi, Michael, and David visit another roller coaster. Elena snaps a picture of part of the coaster from the park entrance. The diagram at the right represents this part of the coaster. Do you think quadratic, cubic, or quartic function would be the best model for this part of the coaster? Clearly explain your choice?



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02** This model must be Quartic function, because it has 3 relative extrema. The highest degree expected would be 4.

**Partial credit: 01** Quartic ( biquadratic otherwise)

**No credit: 00** :other response / no response

<p align="center"><b><u>Domain: Mathematics literacy</u></b></p>	<p align="center"><b><u>Theme: POLYNOMIALS</u></b></p>	<p align="center"><b><u>Class: X</u></b></p> <p align="center"><b><u>Expected time: 5 minutes</u></b></p> <p align="center"><b><u>Total credit: 2</u></b></p>												
<p><b>Description of Item</b></p> <table border="1" data-bbox="193 869 603 1258"> <tr><td align="center">R</td><td><b>Text</b></td></tr> <tr><td align="center">R</td><td><b>Image</b></td></tr> <tr><td></td><td><b>Table</b></td></tr> <tr><td></td><td><b>Graph</b></td></tr> <tr><td></td><td><b>Map</b></td></tr> <tr><td></td><td><b>Poem</b></td></tr> </table>	R	<b>Text</b>	R	<b>Image</b>		<b>Table</b>		<b>Graph</b>		<b>Map</b>		<b>Poem</b>	<p><b>Learning outcome:</b></p> <p><b>(as per NCERT)</b></p> <p>The learner develops a relationship between algebraic and graphical methods of finding the zeroes of a polynomial</p>	
R	<b>Text</b>													
R	<b>Image</b>													
	<b>Table</b>													
	<b>Graph</b>													
	<b>Map</b>													
	<b>Poem</b>													

30.7 David wants to find out when the coaster dips below the ground. Identify all the zeros of  $h(t) = -2t^3 + 23t^2 - 59t + 24$ . Clearly interpret the real-world meaning of these zeros.

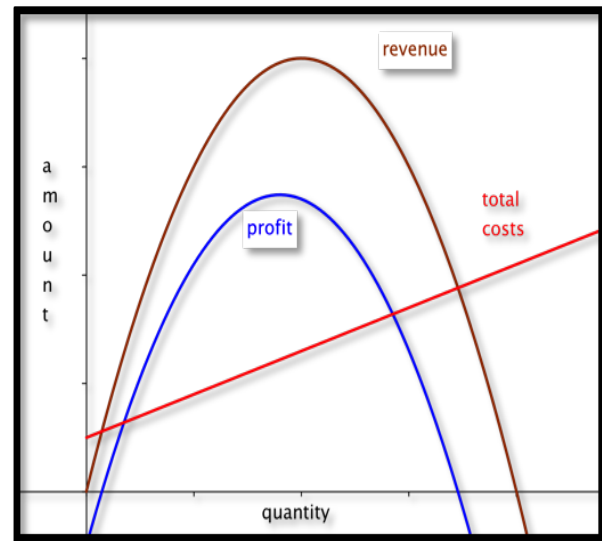
**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	6

**Full credit: 06** REAL ZEROES are:  $h(\frac{1}{2}) = 0$ ,  $h(3) = 0$ ,  $h(8) = 0$  The coaster went into the tunnel at  $\frac{1}{2}$  seconds and 8 seconds. At 3 seconds it came out of the underground tunnel.

**Partial credit: 03** finding only zeroes

**No credit: 00** :other response / no response



### Item : (31) Ticket prices

31.1 A theatre complex charging Rs. 7.00 per ticket is averaging 640 customers per evening. They estimate that each ticket is reduced by Rs.  $m$  it will bring in 'm' more customers. Write an expression for the cost of each discounted ticket.

#### **Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
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Competency cluster	formulating situations mathematically
Overarching Idea	Change and relationships
Context	Occupational
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	2

**Description of Answer Key and Credits**

<p><b><u>Full credit: 02</u></b> 7- m ;</p> <p><b><u>Partial credit: 01</u></b> No partial credit</p> <p><b><u>No credit: 00</u></b> :other response / no response</p>
--

<p><b><u>Domain: Mathematics literacy</u></b></p>	<p><b><u>Theme: POLYNOMIALS</u></b></p>	<p><b><u>Class: X</u></b></p> <p><b><u>Expected time: 3 minutes</u></b></p> <p><b><u>Total credit: 2</u></b></p>												
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R	Text													
R	Image													
	Table													
	Graph													
	Map													
	Poem													

31..3 If the theatre owner wishes to bring in 100 more customers, then what would be the quadratic polynomial for the situation?

**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Change and relationships
Context	Occupational
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	3

**Full credit: 02:  $50m^2+380m+4480$**

**Partial credit: 01 (7-m/2) (640+100m)**

**No credit: 00 :other response / no response**

<b><u>Domain: Mathematics literacy</u></b>	<b><u>Theme:POLYNOMIALS</u></b>	<b><u>Class: X</u></b> <b><u>Expected time:3 minutes</u></b> <b><u>Total credit: 2</u></b>
--	---------------------------------	--

<b>Description of Item</b>		<b>Learning outcome:</b> <b>(as per NCERT)</b>  The learner identifies or classifies polynomials among algebraic expressions and also factorises them by applying appropriate algebraic identities.
R	<b>Text</b>	
R	<b>Image</b>	
	<b>Table</b>	
	<b>Graph</b>	
	<b>Map</b>	
	<b>Poem</b>	

### Item (32) Making a Wooden chest

32.1 Yash designs and builds handmade wooden furniture. He is designing a new box to have a volume of 48 cubic feet. All of the boxes he builds are 2 feet wider than their height and 2 feet longer than their width. Represent the volume of new box with a polynomial in  $x$ .



**Mathematical Literacy**

FRAMEWORK	CHARACTERISTICS
Competency cluster	employing mathematical concepts
Overarching Idea	Space and Shape
Context	Scientific
Item Format	Short Answer
Cognitive process	Skill
Proficiency Level	2

**Full credit: 02** volume =  $x(x+2)(x+4) = x^3+6x^2+8x$

**Partial credit: 01**  $x(x+2)(x+4)$

**No credit: 00** :other response / no response

**TEST ITEM 11.1 GRASSLAND WITH A FLOWERBED**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of rectangle and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Societal
Item Format	Simple multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 11.1 Full credit ( b) (3x + 3) m No credit Other responses and missing
--

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KVS Region: Bhopal

**TEST ITEM 11.2 GRASSLAND WITH A FLOWERBED**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X
---------------------------------	------------------------------	------------

		EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of rectangle and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Societal
Item Format	Simple multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

11.2 Full credit ( a)( $8x + 6$ ) mNo credit Other responses and missing
--

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KVS Region: Bhopal

**TEST ITEM 11.3GRASSLAND WITH A FLOWERBED**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM	LEARNING OUTCOMES :-	To make the students aware of the properties of rectangle and

TEXT AND IMAGE		solve quadratic equation.
----------------	--	---------------------------

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Societal
Item Format	11.3 Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

11.3 Full credit x = 20 m. Partial credit If equation is correct but solution is wrong

No credit Other responses and missing

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**TEST ITEM 11.4 GRASSLAND WITH A FLOWERBED**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM	LEARNING OUTCOMES :-	To make the students aware of the properties of rectangle and

TEXT AND IMAGE		solve quadratic equation.
----------------	--	---------------------------

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Societal
Item Format	Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

11.4 Full credit Area of grassland =860 m <sup>2</sup> . And that of the flowerbed = 400 m <sup>2</sup> . Partial credit if any one area is correct. No credit Other responses and missing
--

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KVS Region: Bhopal

**TEST ITEM 11.5 GRASSLAND WITH A FLOWERBED**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of rectangle and solve quadratic equation.



**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Societal
Item Format	Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

11.5 Full credit 43:20

No credit Other responses and missing

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**TEST ITEM 12.1 THROWING A BALL**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND GRAPH	LEARNING OUTCOMES :-	To make the students aware of the properties of Physics and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflection
Overarching Idea	Change and relationship
Context	Scientific
Item Format	Simple multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 Nil Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 12.1 Full credit ( c ) 3m No credit Other responses and missing
--

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Name of the Vidyalaya: K. V. Mhow

KVS Region: Bhopal

**TEST ITEM 12.2 THROWING A BALL**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND GRAPH	LEARNING OUTCOMES :-	To make the students aware of the properties of Physics and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflection
Overarching Idea	Change and relationship
Context	Scientific
Item Format	12. 2 Complex multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

Nil Credit: 0

**Description of Answer Key and Credits:**

12.2 Full credit ( d) 0 m

No credit Other responses and missing

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### TEST ITEM 12.3 THROWING A BALL

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X  EXPECTED TIME :- 4MIN  TOTAL CREDIT :- 2
DESCRIPTION OF ITEM  TEXT AND GRAPH	LEARNING OUTCOMES :-	To make the students aware of the properties of Physics and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflection
Overarching Idea	Change and relationship
Context	Scientific
Item Format	Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	4

#### Credit Pattern:

Full Credit: 2

Partial Credit: 1

Nil Credit: 0

#### Description of Answer Key and Credits:

12.3 Full credit  $t = -0.2$  or  $t = 3$

Partial credit while solving if some steps are correct.

No credit Other responses and missing

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 KVS Region: Bhopal

### TEST ITEM 12.4 THROWING A BALL

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND GRAPH	LEARNING OUTCOMES :-	To make the students aware of the properties of Physics and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflection
Overarching Idea	Change and relationship
Context	Scientific
Item Format	12.4 Open constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	3

#### Credit Pattern:

Full Credit: 2

Partial Credit: 1

Nil Credit: 0

#### Description of Answer Key and Credits:

12.4The "t = -0.2" is a negative time, impossible in our case.

No credit Other responses and missing

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**TEST ITEM 12.5 THROWING A BALL**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND GRAPH	LEARNING OUTCOMES :-	To make the students aware of the properties of Physics and solve quadratic equation.

**.MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflection
Overarching Idea	Change and relationship
Context	Scientific
Item Format	12.5 Short response item
Cognitive process	Interpreting , problem solving.
Proficiency level	5

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

Nil Credit: 0

**Description of Answer Key and Credits:**12.5 Full credit  $h = 12.5$  to  $12.8$  m (from graph or calculations )

No credit Other responses and missing

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**TEST ITEM 13.1 WINDOW CURTAINS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of right triangle and rectangles and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Personal
Item Format	Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	1

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 13.1 Full credit (c) isosceles triangle No credit Other responses and missing
---

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**TEST ITEM 13.2 WINDOW CURTAINS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X
---------------------------------	------------------------------	------------

		EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of right triangle and rectangles and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Personal
Item Format	Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

13.2 Full credit ( a ) 1 : 3No credit Other responses and missing

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KVS Region: Bhopal

**TEST ITEM 13.3WINDOW CURTAINS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM	LEARNING OUTCOMES :-	To make the students aware of the properties of right triangle



TEXT AND IMAGE		and rectangles and solve quadratic equation.
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### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Personal
Item Format	13.2 Closed constructed respons
Cognitive process	Interpreting, problem solving.
Proficiency level	4

#### Credit Pattern:

Full Credit: 2

Partial Credit: 1

No Credit: 0

#### Description of Answer Key and Credits:

13.3 Full credit length = 24 inches, breadth = 36 inches.

Partial credit formation of quadratic equation  
No credit Other responses and missing

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### TEST ITEM 13.4 WINDOW CURTAINS

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of right triangle and rectangles and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Personal
Item Format	13.4 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**13.4 Full credit 432 square inches  
No credit Other responses and missing

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**TEST ITEM 13.5 WINDOW CURTAINS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of right triangle and rectangles and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Space and shape
Context	Personal

Item Format	closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

13.5 Full credit 120 inches. No credit Other responses and missing

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**TEST ITEM 14.1A TRIP BY MOTOR BOAT**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of physics and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflections
Overarching Idea	Change and relationship
Context	Societal
Item Format	14.1Complex multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**ANSWERS 14.1 Full credit (c)  $(20 - x)$  km/hr

No credit Other responses and missing

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**TEST ITEM 14.2A TRIP BY MOTOR BOAT**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of physics and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflections
Overarching Idea	Change and relationship
Context	Societal
Item Format	14.2 Complex multiple choice
Cognitive process	Interpreting , problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

14.2 Full credit Option a)	No credit Other responses and missing
----------------------------	---------------------------------------

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**TEST ITEM 14.3A TRIP BY MOTOR BOAT**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of physics and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflections
Overarching Idea	Change and relationship
Context	scientific
Item Format	14.3 Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	4

#### Credit Pattern:

Full Credit: 2 Partial Credit: 1 No Credit: 0

#### Description of Answer Key and Credits:

14.3 Full credit  $x^2 + 30x - 400 = 0$   $x = -40, x = 10$

Partial credit for some correct steps

No credit Other responses and missing

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### TEST ITEM 14.4A TRIP BY MOTOR BOAT

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of physics and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Reflections
Overarching Idea	Change and relationship
Context	Scientific
Item Format	14.4 Closed constructed response
Cognitive process	Interpreting , problem solving.
Proficiency level	3

#### Credit Pattern:

Full Credit: 2

Partial Credit: 1

No Credit: 0

#### Description of Answer Key and Credits:

14.4 Full credit speed can't be negative.

No credit Other responses and missing

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**TEST ITEM 15.1 A PICNIC BY TWO CARS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 6 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**ANSWERS15.1 Full credit ( a)  $x+5$  km

No credit Other responses and missing

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**TEST ITEM 15.2 A PICNIC BY TWO CARS**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 6 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	15.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:****ANSWERS**

15.2 Full credit  $\frac{400}{x} - \frac{400}{x+5} = 4$   $x^2 + 5x - 500 = 0$

$x = 20, x = -25$

Partial credit if values is correct but solution is wrong

No credit Other responses and missing

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### TEST ITEM 15.3 A PICNIC BY TWO CARS

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 6 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	15.3 Closed constructed response

Cognitive process	Interpreting, problem solving.
Proficiency level	4

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:****ANSWERS**15.3 Full credit yes ,  $D > 0$  real and distinct roots

Partial credit If yes, but without reason

No credit Other responses and missing

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**TEST ITEM 16.1****COMBAT OF BHEESHM & ARJUN**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	16.1 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:****Full Credit: 2 Partial Credits: 1 No Credit: 0****Description of Answer Key and Credits:**

ANSWERS 16.1 Full credit ( a ) x/2 Arrows

No credit Other responses and missing

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**TEST ITEM 16.2****COMBAT OF BHEESHM & ARJUN**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERSTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	16.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:****Full Credit: 2 Partial Credits: 1 No Credit: 0****Description of Answer Key and Credits:**

Full credit 16. 24Vx+1 Arrows
No credit Other responses and missing

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**TEST ITEM 16.3****COMBAT OF BHEESHM & ARJUN**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	16.3 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

**Credit Pattern:****Full Credit: 2 Partial Credits: 1 No Credit: 0****Description of Answer Key and Credits:**

<p>16.3. Full credit <math>x/2+6+3+4\sqrt{x+1}=x</math></p> $\Rightarrow x + 20 + 8\sqrt{x} = 2x$ $x - 8\sqrt{x} - 20 = 0$ <p>( Let <math>x=y^2</math>) <math>Y^2 - 8y - 20 = 0</math></p> $y = 10, y = -2$ <p>Partial credit if values is correct but solution is wrong</p> <p>No credit Other responses and missing</p>
---

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**TEST ITEM 16.4****COMBAT OF BHEESHM & ARJUN**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X
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		EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	16.4 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

#### Credit Pattern:

**Full Credit: 2 Partial Credits: 1 No Credit: 0**

#### Description of Answer Key and Credits:

16.4 Full credit ,x=100 No credit other responses and missing.
---

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**TEST ITEM 17.1 PEACOCK V/S SNAKE**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Personal
Item Format	Simple multiple choice
Cognitive process	Employing, problem solving.
Proficiency level	1

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 17.1 Full credit ( b )  No credit Other responses and missing
---

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**TEST ITEM 17.2 PEACOCK V/S SNAKE**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERSTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Personal
Item Format	17.1 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

17.2 Full credit ( a ) (27-x)m
No credit Other responses and missing

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**TEST ITEM 17.3 PEACOCK V/S SNAKE**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :-5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Personal
Item Format	17.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

### Credit Pattern:

Full Credit: 2 Partial Credit: 1 No Credit: 0

### Description of Answer Key and Credits:

<p>17.3 Let distance decided by peacock = x</p> <p>snake will be at as distance of 27-x peacock distance would be equal to</p> $x^2 = 9^2 + (27-x)^2$ <p>distance covered by both = 15 m</p> <p>Partial credit if values is correct but solution is wrong</p> <p>No credit Other responses and missing</p>
--

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**TEST ITEM 17.4 PEACOCK V/S SNAKE**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Personal
Item Format	Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

**Credit Pattern:**

Full Credit: 2 Partial Credit: 1 No Credit: 0

**Description of Answer Key and Credits:**

distance from hole =  $(27-15) \text{ m} = 12\text{m}$

No credit Other responses and missing

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**TEST ITEM 18.1 RECTANGULAR POND**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	18.1 Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit:2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 18.1 Full credit ( c )
No credit Other responses and missing

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**TEST ITEM 18.2 RECTANGULAR POND**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	18.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

18.2 Full credit length = $(50-2x)m$ , breadth = $(40-2x) m$
No credit Other responses and missing

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**TEST ITEM 18.3 RECTANGULAR POND**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	18.3 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

#### Credit Pattern:

Full Credit:2

Partial Credit: 1

No Credit: 0

#### Description of Answer Key and Credits:

<p>3. Let the width of the grass strip be 'x'  <math>(50-2x)(40-2x) = 816</math>  <math>\Rightarrow x^2 - 45x + 296 = 0</math>  <math>\Rightarrow x = 37, x = 8</math>            But <math>x = 37</math> is not possible  <math>\therefore</math> Width of the grass strip = 8m            Partial credit if values is correct but solution is wrong            No credit Other responses and missing</p>
--

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### TEST ITEM 18.4 RECTANGULAR POND

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

#### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	18.4 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

#### Credit Pattern:

Full Credit:2

Partial Credit: 1

No Credit: 0

#### Description of Answer Key and Credits:

18.4 Full credit: Length of the pond =  $(50-16)m = 34m$  Breadth of the pond =  $(40-16)m = 24m$

Partial Credit: If any one of them is correct No credit Other responses and missing

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**TEST ITEM 19.1 PICNIC PARTY**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	19.1 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

**Credit Pattern:****Full Credit: 2****Partial Credits: 1****No Credit: 0****Description of Answer Key and Credits:**

ANSWERS 19.1 Full credit

$$\frac{2000}{x-5} - \frac{2000}{x} = 20$$

$$x^2 - 5x - 500 = 0$$

$$x = -20, x = 25$$

Partial credit if values is correct but solution is wrong

No credit Other responses and missing

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### TEST ITEM 19.2      PICNIC PARTY

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

## MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	19.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:****Full Credit: 2****Partial Credits: 1****No Credit: 0****Description of Answer Key and Credits:**

ANSWERS 19.2 Full credit 20	No credit Other responses and missing
-----------------------------	---------------------------------------

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**TEST ITEM 19.3 PICNIC PARTY**

DOMAIN : - MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN
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		TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

## MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Cognitive process	Interpreting, problem solving.
Proficiency level	3

**Credit Pattern:**

**Full Credit: 2**

**Partial Credits: 1**

**No Credit: 0**

**Description of Answer Key and Credits:**

ANSWERS 19.3 Full credit 2100	No credit Other responses and missing
-------------------------------	---------------------------------------

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KVS Region: Bhopal

**TEST ITEM 19.4 PICNIC PARTY**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	19.4 Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:****Full Credit: 2****Partial Credits: 1****No Credit: 0****Description of Answer Key and Credits:**

ANSWERS 19.4 Full credit 1000

No credit Other responses and missing

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Name of the Vidyalaya: K. V.Sarni

KVS Region: Bhopal

**TEST ITEM 19.5 PICNIC PARTY**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 4 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.



**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	19.5 Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	3

**Credit Pattern:****Full Credit: 2****Partial Credits: 1****No Credit: 0****Description of Answer Key and Credits:**

ANSWERS 19.5 Full credit 100	No credit Other responses and missing
------------------------------	---------------------------------------

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**TEST ITEM 20.1 SEATING ARRANGEMENT IN AUDITORIUM**

DOMAIN : - MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	20.1 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

Credit Pattern:

Full Credit: 2

Partial Credits: 1

No Credit: 0

Description of Answer Key and Credits:

ANSWERS 20.1 Full credit $x^2 - 20x - 300 = 0$
---

X=30, -10

Partial credit If quadratic equation is correctly framed without correct answer.

No credit Other responses and missing

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Name of the Vidyalaya: K. V.Sarni

KVS Region: Bhopal

**TEST ITEM 20.2 SEATING ARRANGEMENT IN AUDITORIUM**

DOMAIN : - MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	20.2 Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

Credit Pattern:

Full Credit: 2

Partial Credits: 1

No Credit: 0

Description of Answer Key and Credits:

ANSWERS 20.2 Full credit X=30, -10

No credit Other responses and missing

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**TEST ITEM 20.3 SEATING ARRANGEMENT IN AUDITORIUM**

DOMAIN : - MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

Credit Pattern:

Full Credit: 2

Partial Credits: 1

No Credit: 0

Description of Answer Key and Credits:

ANSWERS 20.3 Full credit 20 No credit Other responses and missing



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**TEST ITEM 20.4 SEATING ARRANGEMENT IN AUDITORIUM**

DOMAIN : - MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of quadratic equations and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	20.3 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

Credit Pattern:

Full Credit: 2

Partial Credits: 1

No Credit: 0

Description of Answer Key and Credits:

ANSWERS 20.4 Full credit 1200	No credit Other responses and missing
-------------------------------	---------------------------------------

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**TEST ITEM 21.1****LAND DONATION**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of circles and solve quadratic equation.

**MATHEMATICAL LITERACY**

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Societal
Item Format	21.1 Simple multiple choice
Cognitive process	Interpreting, problem solving.
Proficiency level	2

**Credit Pattern:**

Full Credit: 2

Partial Credit: 1

No Credit: 0

**Description of Answer Key and Credits:**

ANSWERS 21.1 Full credit ( c ) right triangle

No credit Other responses and missing

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KVS Region: Bhopal

**TEST ITEM 21.2****LAND DONATION**

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of circles and solve quadratic equation.

## MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Educational
Item Format	21.2 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

### Credit Pattern:

Full Credit: 2

Partial Credit: 1

No Credit: 0

### Description of Answer Key and Credits:

21.2 Full credit BC = 15 m, AD = 24 m

No credit Other responses and missing

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KVS Region: Bhopal

## TEST ITEM 21.3LAND DONATION

DOMAIN :- MATHEMATICAL	THEME :- QUADRATIC	CLASS :- X
------------------------	--------------------	------------

LITERACY	EQUATIONS	EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of circles and solve quadratic equation.

### MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Educational
Item Format	21.3 Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	3

#### Credit Pattern:

Full Credit: 2

Partial Credit: 1

No Credit: 0

#### Description of Answer Key and Credits:

21.3 Full credit 84 squaremeter
Partial credit if values is correct but solution is wrong
No credit Other responses and missing

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### TEST ITEM 21.4

### LAND DONATION

DOMAIN :- MATHEMATICAL LITERACY	THEME :- QUADRATIC EQUATIONS	CLASS :- X
---------------------------------	------------------------------	------------

		EXPECTED TIME :- 5 MIN TOTAL CREDIT :- 2
DESCRIPTION OF ITEM TEXT AND IMAGE	LEARNING OUTCOMES :-	To make the students aware of the properties of circles and solve quadratic equation.

## MATHEMATICAL LITERACY

FRAMEWORK	CHARACTERISTICS
Competency Cluster	Connections
Overarching Idea	Change and relationship
Context	Educational
Item Format	Closed constructed response
Cognitive process	Interpreting, problem solving.
Proficiency level	4

### Credit Pattern:

Full Credit: 2

Partial Credit: 1

No Credit: 0

### Description of Answer Key and Credits:

21.4 Full credit 150 sq. m

No credit Other responses and missing

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Name of the Vidyalaya: K. V.Hoshangabad

KVS Region: Bhopal

**CRITICAL AND CREATIVE THINKING ITEMS****CLASS X : CHAPTER 4 : QUADRATIC EQUATIONS****INDEX**

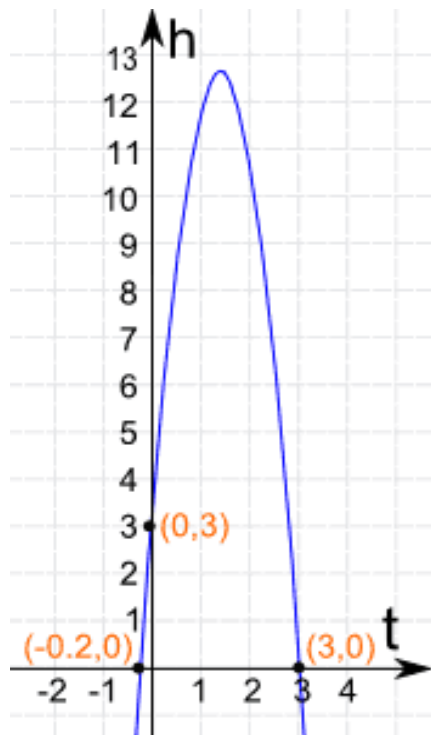
<b>S.No.</b>	<b>Theme of the item</b>
36.	Grass land with a flower bed
37.	Throwing a ball
38.	Window curtains
39.	A trip by motor boat
40.	A picnic by two cars
41.	Combat of Bheeshm&Arjun
42.	Peacock v/s snake
43.	Rectangular pond
44.	Picnic party
45.	Seating arrangement in auditorium
46.	Land donation





## TEST ITEM 12 THROWING A BALL

Jackson throws a ball with a speed of 14 m/s which follows the curve  $h = -5t^2 + 14t + 3$ .



Where “h” represents height in meters and time “t” in seconds

12.1 What is the height of the ball initially ?

- (a) 12m                      (b) 13 m                      (c) 3m                      (d) - 3 m

12.2 What is the height of the ball after 3 sec.?

- (a) 3m                      (b) 12 m                      (c) 13 m                      (d) 0 m

12.3 Find the possible values of 't' when the ball touches the ground.

12.4 Can the value of 't' be negative when the ball touches the ground?

12.5 Find the maximum height attained by the ball.

## TEST ITEM 13 WINDOW CURTAINS

Neelu wants to make the curtains for her window as shown in the figure. The window is in the shape of a rectangle, whose length and the breadth are in the ratio 2 : 3. If the area of the window is 864 square inches.



13.1 What is the shape of the window that is uncovered?

- (a) Right triangle      (b) Equilateral triangle.      (c) Isosceles triangle      (d) Rectangle

13.2 What will be the ratio of two sides of each curtain (other than hypotenuse) ?

- (a) 1 : 3      (b) 2 : 3      (c) 1 : 1      (d) 3 : 2

13.3 Find the dimensions of the window.

13.4 How much window area is covered by the curtains?

13.5 What will be the perimeter of the window ?

## TEST ITEM 14 A TRIP BY MOTOR BOAT

John and Priya went for a small picnic. After having their lunch Priya insisted to travel in a motor boat. The speed of the motor boat was 20 km/hr. Priya being a Mathematics student wanted to know the speed of the current. So she noted the time for upstream and downstream. She found that for covering the distance of 15 km the boat took 1 hour more for upstream than downstream.



14.1 Let speed of the stream be  $x$  km/hr. then speed of the motorboat in upstream will be

(a) 20 km/hr (b)  $(20 + x)$  km/hr (c)  $(20 - x)$  km/hr (d) 2 km/hr

14.2 What is the relation between speed distance and time?

(a)  $\text{speed} = \frac{\text{distance}}{\text{time}}$  (b)  $\text{distance} = \frac{\text{speed}}{\text{time}}$  (c)  $\text{time} = \text{speed} \times \text{distance}$  (d) none of these

14.3 Frame the quadratic equation and solve to find the speed of current.

14.4 On solving , you are getting two values, one positive and one negative. Why we can't take the negative value?

#### TEST ITEM 15 A PICNIC BY TWO CARS

Nidhi and Ria are very close friends. Nidhi's parents own a Toyota Liva. Ria's parents own a Maruti Alto. Both the families decide to go for a picnic to Somnath temple in Gujrat by their own cars. Nidhi's car travels  $x$  km/h while Ria's car travels 5 km/h more than Nidhi's car. Nidhi's car uses 4 hrs more than Ria's car in covering 400 km.



15.1 In an hour, if Nidhi's car travels  $x$  km then what will be the distance covered by Ria's car in an hour?

- (a)  $(x + 5)$  km      (b)  $(x - 5)$  km      (c)  $x$  km      (d) 5 km

15. Frame the quadratic equation and solve to find the speed of Nidhi's car?

15.3 Whether the coefficient of  $x^2$  and the constant term has opposite signs or not? Is it helpful to conclude something about the nature of roots?

TEST ITEM 16      COMBAT OF BHEESHM & ARJUN

The angry Arjun carried some arrows for fighting with Bheeshm. With the half of the arrows, he cut down the arrows thrown by Bheeshm on him and with six other arrows, he killed the charioteer of Bheeshm. With one arrow each, he knocked down respectively the chariot, flag and the bow of Bheeshm. Finally, with one more than four times the square root of arrows, he laid Bheeshm unconscious on an arrow bed.



16.1 If Arjun had  $x$  arrows then by how many arrows he cut down arrows thrown by Bheeshm?

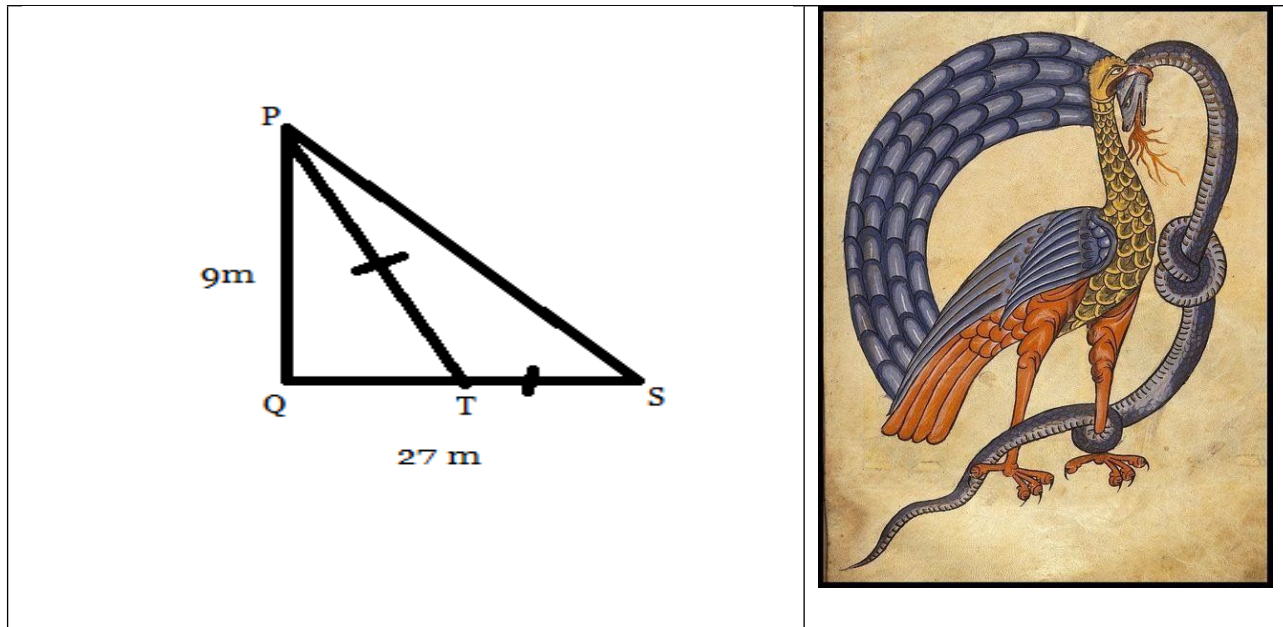
16.2. If Arjun had  $x$  arrows then by how many arrows he laid Bheeshm unconscious on arrow bed?

16.3 Frame and solve the quadratic equation.

16.4 The total number of arrows Arjun had

- (a) 90                      (b) 100                      (c) 10                      (d) 50

A peacock is sitting on the top of a pillar which is 9m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake the peacock ounces on it. Their speeds are equal and the peacock catches the snake finally .



17.1 Distance is equal to.

- (a) Speed + time      (b) speed X time      (c) speed/time      (d) time/speed

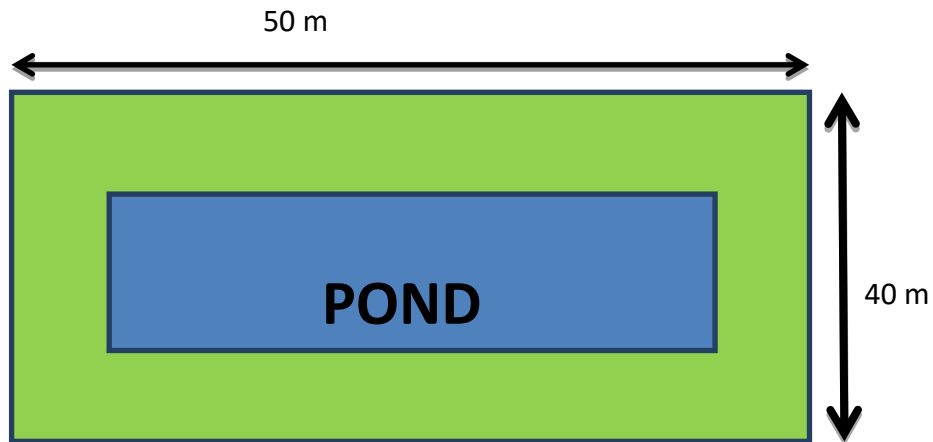
17.2 If  $ST = PT = (x)m$  ,Then what is distance TQ in terms of x ?

17.3 Form the equation and solve it.

17.4 At what distance from the hole is the snake caught?

## TEST ITEM 18 RECTANGULAR POND

In a rectangular park of dimensions 50m X40m, a rectangular pond is constructed so that the green area strip of uniform width surrounding the pond will be 1184 m<sup>2</sup>



18.1 What is the area of pond?

- (a) 814 m<sup>2</sup>                      (b) 1184 m<sup>2</sup>                      (c) 816 m<sup>2</sup>                      (d) 2000 m<sup>2</sup>

18.2 If uniform width of strip is  $(x)$ m then find the dimensions of pond in terms of  $x$ .

18.3 Form and Solve the quadratic equation.

18.4 Find the length and breadth of pond?



## TEST ITEM 19 PICNIC PARTY

Some students planned a picnic. The budget for picnic was Rs 2000 but 5 students failed to attend the picnic and thus the contribution for each student is increased by Rs 20.

Cost of items.

S. No.	Article	Cost per student
1	Entry ticket	Rs 5
2	Coffee	Rs 10
3	Food	Rs 25
4	Travelling cost	Rs 50
5	Ice-cream	Rs 15

19.1 Find the number of students planned for picnic.

19.2 Number of students who attended the picnic?

19.3 Calculate the total budget for this picnic.

19.4 How much money they spent for travelling –

(a) Rs 500      (b) Rs 800      (c)Rs 1000      (d)Rs 3750.

19.5 How much more money do they spent on the ice-cream as compare to coffee?

(a) Rs 400      (b) Rs 375      (c)Rs 200      (d)Rs 100.

TEST ITEM 20      SEATING ARRANGEMENT IN AUDITORIUM

In an auditorium, seats are arranged in rows and columns. The number of rows were equal to the number of seats in each row. When the number of rows were doubled and the number of seats in each row was reduced by 10, the total number of seats increased by 300.



20.1 Frame and solve the quadratic equation.

20.2 How many number of rows are there in the original arrangement.

(a) 35 (b) 20 (c) 10 (d) 30

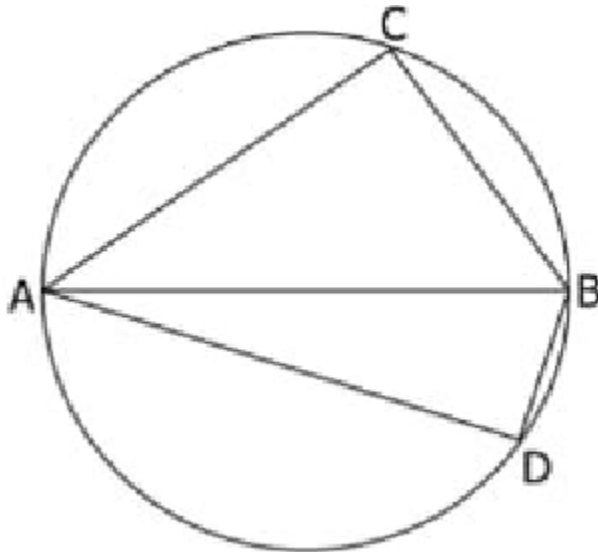
20.3 How many number of columns are there in the auditorium after re-arrangement .

(a)30 (b) 20 (c) 40 (d) 35

20.4 Find the number of seats in the auditorium after re-arrangement.

### TEST ITEM 21 LAND DONATION

A rich man donated a circular piece of land of diameter 25m to an orphanage center. The deciding committee of orphanage center planned a quadrilateral shaped park inside that circular portion as shown in figure. Where the side AC is 20m and BD is 7m. They planned to keep the area of triangle ADB for different swings, slides, seesaw etc. and the area of triangle ACB to play different types of games.



21.1 What type of triangle is  $\triangle ACB$ ?

(a) Acute triangle (b) obtuse triangle (c) right triangle (d) none of these

21.2 Find the value of BC and AD.

21.3 Find the area of the land which is planned for different types of swings, slides etc.

21.4 Find the area of triangle ACB to play different types of games.

**CRITICAL AND CREATIVE THINKING ITEMS****CLASS X : CHAPTER 5: ARITHMETIC PROGRESSION****INDEX**

<b>S.No.</b>	<b>Theme of the item</b>
47.	Beautiful pattern
48.	Construction of a building
49.	Arrangement of Stones
50.	Money needed for higher study
51.	Tour of Manali
52.	Distances between planets

Domain : Mathematical Literacy	Topic : Arithmetic Progression	Class: X Expected Time :10 minutes Total credit: 2 x 5 = 10
Description of items : Text / Image	Learning outcomes: Understanding Arithmetic Progression and application viz; nth term , sum to n terms	
Expected competencies: interpret and evaluate	Types of questions: Short response items	
	Credit Pattern : Full credit : 02 Half credit: 01 Nil credit:0	
	Proficiency level of question: 3	

**Beautiful pattern:** Venkatesh has observed a beautiful pattern on the wall of a cricket stadium.



- He wants to know the number of boxes in 7<sup>th</sup> row can you help him to find the same?
- In the last row there are 23 boxes can you find the total number of rows on the wall?
- Can you give the total number of boxes in the Pattern?
- If the cost of painting one box is rupees 2/- Can you find the total cost of painting the pattern?
- Can you give the formula for cost of painting of 'n' such walls?

#### Description of answer key and credits:

The pattern is an AP containing boxes 3, 5, 7 ..... boxes in corresponding rows 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> ....

- Answer : Number of boxes in 7<sup>th</sup> row =  $3 + 6 \times 2 = 15$  Full credit  
any other answer nil credit.
- Answer :  $3 + (n - 1) \times 2 = 23$  ;  $n = 11$ , 11<sup>th</sup> row Full credit  
any other answer nil credit.
- Total number of boxes =  $11/2(2 \times 3 + 10 \times 2) = 143$  Full credit  
any other answer nil credit.

iv)	Total cost of painting = $143 \times 2 =$ Rupees 286. Full credit answer nil credit.	any other
v)	Formula for cost of painting 'n' such walls is 286 n. full credit answer nil credit.	any other

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K V S Region: Patna Region

Domain : Mathematical Literacy	Topic : Arithmetic Progression	Class: X Expected Time :20 minutes Total credit: $2 \times 5 = 10$					
Description of items : Text / Image	Learning outcomes: Understanding Arithmetic Progression and application viz; nth term , sum to n terms						
Expected competencies: interpret and evaluate	Types of questions: Short response items						
	<table border="1"> <tr> <td>Credit Pattern :</td> </tr> <tr> <td>Full credit : 02</td> </tr> <tr> <td>Half credit: 01</td> </tr> <tr> <td>Nil credit: 0</td> </tr> <tr> <td>Proficiency level of question: 5</td> </tr> </table>		Credit Pattern :	Full credit : 02	Half credit: 01	Nil credit: 0	Proficiency level of question: 5
Credit Pattern :							
Full credit : 02							
Half credit: 01							
Nil credit: 0							
Proficiency level of question: 5							

**Construction of a building:** Raman is a contractor; he is constructing a building of many floors. The building has interesting design on each floor it has open space thus number of rooms decreases as we go up. If number of bricks for construction of a room is 1500. The number of bricks required for ground floor is 30,000 on 1<sup>st</sup> floor it is 27,000 on 2<sup>nd</sup> floor It is 24,000 ..... and so on

- i) Find the total number of rooms on ground floor.
- ii) Find the number of rooms on 5<sup>th</sup> floor.
- iii) Find the maximum number of floors that can be build.
- iv) Find the total bricks required for construction of maximum floors.
- v) Find the cost of bricks for first three floors at the rate of Rs.10 per brick.

Description of answer key and credits:
--

- |      |  |                  |
|------|--|------------------|
| i)   | Number of rooms on ground floor = $30000/1500 = 20$ . Full credit<br>answer nil credit.  | any other        |
| ii)  | Number of room on 5 <sup>th</sup> floor = $20 + 5(-2) = 10$ . Full credit<br>answer nil credit.  | any other        |
| iii) | For maximum floors $a_n > 0$ ; $20 + (-2)(n - 1) > 0$ ; $n - 1 < 10$ ; $n < 11$ ; hence maximum number<br>of floors = 10. Full credit<br>nil credit. | any other answer |
| iv)  | Number of bricks = $1500(10/2(20+2)) = 1,65,000$ Full credit<br>answer nil credit.   | any other        |
| v)   | Cost of bricks = $Rs.10 \times 3/2(60000-6000) = Rs 8,10,000$ . Full credit<br>any other answer nil credit.  |                  |

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K V S Region: Patna Region





Partial credit :  $10 \times n + 2 [ 10 \times (n-1) + 10 \times (n-2) + \dots + 10 \times 2 + 10 \times 1 ] + 2 [ 10 \times n + 10 \times (n-1) + 10 \times (n-2) + \dots + 10 \times 2 + 10 \times 1 ]$

No Credit : Any other answer or missing answer

d. Full Credit : Number of stones = 25

No Credit : Any other answer or missing answer

NAME OF TEACHER : – SHAMIM AKHTAR

DESIGNATION : – PGT (MATH)

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PHONE NO: – 8210679297

NAME OF THE VIDYALAYA : – K V KANKARBAGH, PATNA

REGION: – PATNA

Domain:- ML Topic- Arithmetic Progression Class:- X  
 Expected Time:- 15 minutes  
 Total Credit:- 08

**Theme:- Money needed for higher study**

Mr.Dinkar has just admitted his son Dipu in class I . Dipu is a very bright student and doing well. His father belongs to lower middle income group so he has planned to save the certain amount of money every year on the name of higher studies of his son. Suppose Dipu never fails in any class and did not repeat in same class. As per his plan Dinkar will need an amount of Rs 5 lakhs for the higher studies of his son after completion of school (10+2). So he started saving an amount of Rs 20,000 in the first year of his study and increased his yearly savings by Rs 5,000 each year. When Dipu will pass his class XII, it will be his choice to decide about his study.

- (i) What will be his saving amount for the year in which Dipu will be in class XII ?
- (ii) Will Dinkar be able to have his gross saving sufficient for Dipu's higher study in the year in which Dipu will pass out Class XII.
- (iii) How much amount will be left with Dinkar if he paid 5 lakhs to Dipu for his higher study as per his plan?
- (iv) Dipu decided to go to abroad for further study so he needs Rs 9 lakhs . Dipu's father do not have that much amount of money. He thought about per year increase in his saving. How much amount per year increase he should have been saving to create his total saving equal to Rs 9 lakhs in the year Dipu is in his class XII?

**Learning Outcomes** :- 1.Children will be able to formulate and employ the concept of Arithmetic progression their real life situation.

**Credit Pattern :-**

Full Credit :- 02 marks

Partial Credit:- 01 marks

NIL Credit: - 00 marks

**Proficiency Level of question:- 4**

**Description of Answer Key and Credits:**

- i) His savings per year are 20000, 25000, 30000, 35000... up to 12 terms Partial credit  
 12<sup>th</sup> year saving amount=  $20000+11 \times 5000 = \text{Rs } 75000$ . Full credit
- ii) Gross Saving of DINKAR =  $20000+25000+30000+\dots+\dots+\dots+75000$ .  
 Partial credit

$$S_{12} = \text{Rs } 5,70,000 \quad \text{Full credit}$$

III) Rs 70000 Full credit

IV) Per year increase = 10,000 Full credit .

Manmohan Singh  
 TGT( MATHS)

K.V.Khagaul

Email: [manmohan4u@ymail.com](mailto:manmohan4u@ymail.com)**Domain:- ML Topic- Arithmetic Progression****Class:- X****Expected Time:- 15 minutes****Total Credit:- 08****Theme:- Tour of Manali**

Rinku and Pawan live in Delhi. They decided to go on a tour of hill station of Manali with family. Manali is 500 km far from Delhi. Rinku and Pawan started their journey at the same time from same place. Rinku was driving his car at uniform speed of 40 km per hour. Pawan is very new in driving so he decided to drive his car at the rate of 20 km per hour in first hour and increased the speed by 5 km in each succeeding hour. In the return journey they planned to stop at a Hotel after driving 5 hours continuously and will take some refreshment. Again Rinku was driving his car at uniform speed of 40 km per hour and Pawan started driving his car at the rate of 20 km per hour in first hour and thought to increase his speed per hour as per Plan.

- (i) Will Pawan's car be able to overtake Rinku's car before reaching to Shimla? Suppose they do not stop anywhere in their journey.
- (ii) How much time it will take Pawan to meet or overtake Rinku's car? Suppose they do not stop anywhere in their journey.
- (iii) At what distance from Delhi Pawan and Rinku will meet or overtake each other?
- (iv) In the return journey they planned to stop at a Hotel after 5 hours of journey and take some refreshment. So Rinku told Pawan that I will drive my car at uniform speed of 40 km per hour but you have to increase your speed. Pawan started driving his car at the rate of 20 km per hour in first hour. What should be the rate of increase in his speed so that they reach hotel at the same time after 5 hours?

**Learning Outcomes :-** 1. Children will be able to formulate and employ the concept of Arithmetic progression their real life situation.

**Credit Pattern :-**

Full Credit :- 02 marks

Partial Credit:- 01 marks

NIL Credit:- 00 marks

**Proficiency Level of question:- 5****Description of Answer Key and Credits**

Suppose Pawan will overtake in  $t$  hours, then speed of Pawan in succeeding hour will be 20, 25, 30, ..... up to  $t$  terms partial credit

$$\text{Now } 40 \times t = \frac{t}{2} [20 \times 2 + (t-1)5]$$

$$t = 9$$

- i) yes in 9<sup>th</sup> hour they will meet /overtake each other. Full credit
- ii) 9 hour full credit
- iii)  $9 \times 40 = 360$  km Full credit
- iv)  $40 \times 5 = \frac{5}{2} [2 \times 20 + (5-1)d]$  partial credit

$d = 10 \text{ km/hour}$  per hour increase in speed = 10 km per hour full credit

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## DISTANCES BETWEEN PLANETS

The distances between planets will vary depending on where each planet is in its orbit around the Sun. Sometimes the distances will be closer and other times they will be farther away.

The reason for this is that the planets have elliptical orbits and none of them are perfect circles. As an example, the distance between the planet Mercury and Earth can range from 77 million km at the closest point, to as far as 222 million km at the farthest. There is a huge amount of difference in the distances between the planets depending on their position on their orbit path.

The table below shows the average distance between earth and different planets

**1 AU ( astronomical unit) is the distance from the Sun to Earth, which is 149,600,000 km.**

### PLANET DISTANCE TABLE-

FROM	TO	DISTANCES (IN km)
Earth	Mars	78,340,000
Earth	Jupiter	628,730,000
Earth	Saturn	1,275,000,000
Earth	Uranus	2,723,950,000
Earth	Neptune	4,351,400,000
Earth	Venus	41,400,000
Earth	Mercury	91,691,000

Read the Table given above and answer the following question.

i) Distance between Earth and Mercury is 91,691,000 km .convert this distance in AU and write this in standard

form.

- ii) 1 AU is equal to 149,600,000 km . Convert it in standard form .
- iii) A planet is  $1.275 \times 10^9$  km far from the Earth. Name the planet.
- iv) Which planet is nearest from the Earth? Write the distance of nearest planet in metre and convert it in standard form.

**Learning Outcomes :-** 1.Children will be able to formulate and employ the concept of Exponent and Power their real life situation.

### Credit Pattern :-

Full Credit :- 02 marks

Partial Credit:- 01 marks

NIL Credit:- 00 marks

**Proficiency Level of question:- 3**

**Description of Answer Key and Credits:**

- i) 0.61 AU partial credit  
6.1X10<sup>-1</sup> AU Full Credit
- ii) 1.496X10<sup>8</sup> Km Full credit
- iii) 1.275X10<sup>9</sup> = 1,275,000,000 km partial credit  
Saturn Full credit
- iv) Venus partial credit  
41,400,000 km = 41,400,000X1000 = 41,400,000,000 m  
4.14X10<sup>10</sup> m Full credit

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