**CRITIRCAL AND CREATIVE THINKING ITEMS**

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

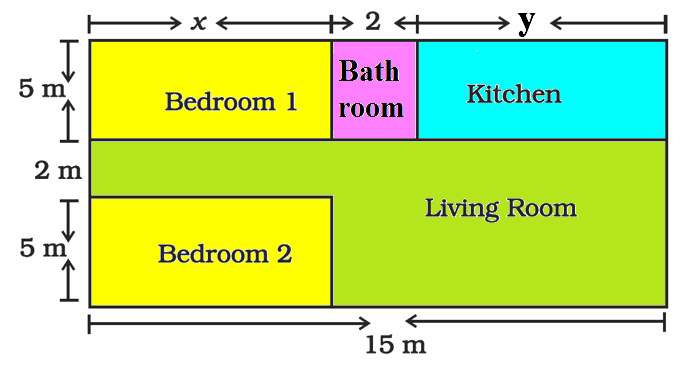
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| **S.No.** | **Theme of the item** |
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|  | Tour to Kedarnath |
|  | Santa’s sleigh |
|  | Exhibition |
|  | Travelling by Boat |
|  | Finding the password |

**Practice Item 01 for Mathematical Literacy**

|  |  |  |
| --- | --- | --- |
| Domain:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  **Layout** | Class(es): **X**  Expected time: **10 min**  Total Credit: **10** |
| Description of Item:  **Text and Image** | 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⇒2x + y = 19

Also, x + 2 + y = 15⇒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

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| --- | --- |
| **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 m

Area of bedroom = 5 x 6 = 30 sq. m

Area of kitchen = 5 x 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 x 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 1m2 laying tiles in kitchen = Rs. 50

Total cost of laying tiles in kitchen = Rs. 50 x 35 = 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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**Practice Item 02 for Mathematical Literacy**

|  |  |  |
| --- | --- | --- |
| Domain:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  Fishing | Class(es): **X**  Expected time: **10 min**  Total Credit: **08** |
| Description of Item:  **Text and Image** | 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,  and



Let  = p and  = 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 = ⇒x + y =7 and

q = ⇒ 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:**

Time =  or 14 hrs 24 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  Building Layout | Class(es): **X**  Expected time: **10 min**  Total Credit: **08** |
| Description of Item:  **Text and Image** | 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 |

**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

 and 

Let = p and = q then we get  and 

84p + 112q = 1 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 =  and q = 

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** |
| 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  Stationery | Class(es): **X**  Expected time: **10 min**  Total Credit: **08** |
| Description of Item:  **Text and Image** | 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

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| --- | --- |
| **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 × 25 = Rs.100

And the cost for 3 pens would be : 3 × 2.50 = Rs. 7.50

Lohith should have paid Rs. 100 + Rs.7.50 = 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 × 16 = Rs. 64

And the cost for 3 pens, if one is for Rs. 16, would be : 3 × 16 = Rs. 48

Lohith should have paid Rs.64 + Rs.48 = 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

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| --- | --- |
| **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

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| --- | --- |
| **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:**

Total cost = Rs. 15 x 20 + Rs. 12 x 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  Stationery – 2 | Class(es): **X**  Expected time: **12 min**  Total Credit: **10** |
| Description of Item:  **Text and Image** | 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”.

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**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

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| --- | --- |
| **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 ⇒x – y + 1 = 0

and 3x = 12 – 2y ⇒ 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables** | Class(es): **X**  Expected time: **10 min**  Total Credit: **08** |
| Description of Item:  **Text and Image** | 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 Kedaranath 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 x 75 = Rs. 1125

For helicopter rental = Rs. 20 x 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 the125 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 x125 = Rs. 4375

Rental for 75 travelers = Rs. 2675

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

Percentage = x 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables**  Santa’s sleigh | Class(es): **X**  Expected time: **08 min**  Total Credit: **06** |
| Description of Item:  **Text and Image** | 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 ⇒ 2 x + 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 x 15 + 2 x 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:  **Mathematical Literacy** | Theme: **Linear Equation in two variables** | Class(es): **X**  Expected time: **10 min**  Total Credit: **08** |
| Description of Item:  **Text and Image** | 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 ⇒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 x 2000 + 4 x 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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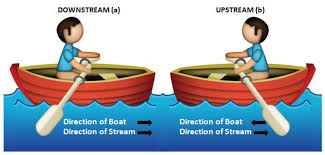
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**Practice Item 09 for Mathematical Literacy**

|  |  |  |
| --- | --- | --- |
| Domain:  **Mathematical Literacy** | Theme: **Linear Equation in two variables** | Class(es): **X**  Expected time: **08 min**  Total Credit: **06** |
| Description of Item:  **Text and Image** | 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 + = 10

+ = 13

Taking = a , = 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 = and b =

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 |

**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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**Practice Item 10 for Mathematical Literacy**

|  |  |  |
| --- | --- | --- |
| Domain:  **Mathematical Literacy** | Theme: **Linear Equation in two variables** | Class(es): **X**  Expected time: **12 min**  Total Credit: **10** |
| Description of Item:  **Text and Image** | 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.

Ones Place

Tens Place

Hundreds place

Thousands Place placeplace

**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:**

Average = = 3

3times the digit in ones place = 3 x 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

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| --- | --- |
| **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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