**CRITIRCAL AND CREATIVE THINKING ITEMS**

**CLASS X : CHAPTER 3 : POLYNOMIALS**

**INDEX**

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| **S.No.** | **Theme of the item** |
|  | Water tank |
|  | The peregrine falcon |
|  | Donation |
|  | Cyclone |
|  | Gym |
|  | Let’s play in the park |
|  | Curiosity rover |
|  | Delicious and Decorative Delight |
|  | Peacock’s pleasure |
|  | Throwing a ball |
|  | Steel frame |
|  | Resistors in parallel |
|  | Everyday Use of Polynomials |
|  | Ticket prices |
|  | Making a Wooden chest |

**Item 6**

(6.1)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials**  **Water Tank** | **Class: X**  **Expected time: 15 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT) .**  **Division Algorithm For Polynomials.** | |     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) = x4+ 2x3- 4x2- 7x -2.  **Mathematical Literacy**   |  |  | | --- | --- | | **FRAMEWORK** | **CHARACTERISTICS** | | Competency cluster | Adaptive reasoning. | | Overarching Idea | Change and relationship | | Context | volume | | Item Format | **Short response item** | | Cognitive process | Problem solving. | | Proficiency Level | 3 |  |  | | --- | | **Credit pattern :**  **Full credit:02**  **Partial credit:01**  **No credit:00** |   **Description of Answer Key and Credits**  x2+3x+1  F.C: 02  (x+1) (x-2) = x2 – x – 2  P.C: 01  X=1cm, volume=10×10×1=100sq.inch  Partial credit: 01  If the substitution is correct  No credit:  Any other response  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

(6.2)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials** | **Class:X**  **Expected time: 05 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the value of polynomial** | |   If x=10 units, what is the volume of the sump.  **Mathematical Literacy**   |  |  | | --- | --- | | **FRAMEWORK** | **CHARACTERISTICS** | | Competency cluster | Conceptual understanding | | Overarching Idea | Change and relationship | | Context | Volume. | | Item Format | **Short response item** | | Cognitive process | Problem solving. | | Proficiency Level | 2 |  |  | | --- | | **Credit pattern :**  **Full credit:02**  **Partial credit:01**  **No credit:00** |   **Description of Answer Key and Credits**  11,528 cubic units.  F.C: 02  Substituting x = 10  P.C: 01  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

(6.3)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials** | **Class: X**  **Expected time:10 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the value of polynomial** | |   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**   |  |  | | --- | --- | | **FRAMEWORK** | **CHARACTERISTICS** | | Competency cluster | Conceptual understanding | | Overarching Idea | Change and relationship | | Context | Surface area | | Item Format | **Short response item** | | 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 = 2X131X19 square units  P.C: 01  11,528 cubic units.  F.C: 02  Substituting x = 10  P.C: 01  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials** | **Class: X**  **Expected time: 05 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the value of polynomial** | |   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 | **Short response item** | | 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  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

**Item 7.**

(7.1)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials**  The peregrine falcon | **Class: X**  **Expected time:10 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  Finding the zeroes of polynomials. | |     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) = ─16t2 ─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 | **Short response item** | | Cognitive process | Problem solving. | | Proficiency Level | 3 |   **Description of Answer Key and Credits**  FULL CREDIT: 02  500= ─16t2 ─20t + 1000  16t2 + 20t ─ 500=0 t=5sec  PARTIAL CREDIT: 01  Any one step from above  NO CREDIT  No response or any other response  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

(7.2)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials** | **Class: X**  **Expected time: 05 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the value of polynomial** | |   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 | **Short response item** | | 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  ─16t2 ─20t + 1000. t=6  ─16 (6)2 ─20 (6) + 1000 = ─16 (36) ─120 + 1000 = 304ft  PARTIAL CREDIT  SUBSTITUTING FOR t=6  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

**Item 8**

(8.1)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials**  **Donation** | **Class: X**  **Expected time:1 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the zeroes of polynomials.** | |   Two sisters Sonu and Meenu where 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 | **Short response item** | | 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% of 1000  =  =50sq.m  Area of the rectangle= l x b  (b+5) x b=50  b=5m  F.C: Therefore, l=10m and b=5m  P.C: 01  Area of the land given to the orphanage  No credit: any other answer  Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

**Item 9**

(9.1)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials**  **Cyclone** | **Class: X**  **Expected time:10 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the value of polynomial** | |   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**   |  |  | | --- | --- | | **FRAMEWORK** | **CHARACTERISTICS** | | Competency cluster | Conceptual understanding | | Overarching Idea | Change and relationship | | Context | Pythagorean’s Theorem. | | Item Format | **Short response item** | | 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 = x2 + 52 | | NC | any other answer |   Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

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**Item 10**

(10.1)

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| |  |  |  | | --- | --- | --- | | **Domain: Mathematics literacy** | **Theme: Polynomials**  **Gym** | **Class: X**  **Expected time: 05 Min.**  **Total credit: 02** | | **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT).**  **Finding the zeroes of polynomials.** | |   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= -16t2 + 8t +8 .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 | **Short response item** | | Cognitive process | Problem solving. | | Proficiency Level | 3 |  |  | | --- | | **Credit pattern :**  **Full credit:02**  **Partial credit:01**  **No credit:00** |   **Description of Answer Key and Credits**   |  |  | | --- | --- | | FC | 1 second | | PC | -16t2 + 8t +8 = 0 | | NC | any other answer |   Name of the Teacher/Item Writer: S.JAYARAMAN  Designation: PGT(MATHS)  Email: gayathri7797@yahoo.co.in  Phone No: 9427523022  Name of the vidyalaya: no1, OE, Trichy  KVS Region: Chennai |  |  |  |  |  |  |  |

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **11.1.Let’s play in the park** | | |

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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**

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| **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 , 4x2+20x+24 OR 4(x2+5x+6) Partial credit:1, (6+2x) (4+2x)

No credit: For any other response

Name of the Teacher/Item Writer:K.Ganesan

Designation:TGT(Maths)

Email:ganesh6662@gmail.com

Phone No:9444666889

Name of the Vidyalaya: AFS Avadi Chennai-55

KVS Region: Chennai

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **11.2. Let’s play in the park** | | |

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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**

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

Name of the Teacher/Item Writer:K.Ganesan

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KVS Region: Chennai

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| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **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 x2 - x−2 in square millimetres. If the width of the piece of metal is x+3 millimetres.

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

**Mathematical Literacy**

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| **FRAMEWORK** | | **CHARACTERISTICS** |
| Competency cluster | | Formulating |
| Overarching Idea | | SPACE AND SHAPE |
| Context | | Scientific |
| Item Format | | Short Answer type |
| Cognitive process | | Interpreting |
| Proficiency Level | | Level 2 |
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| **Credit pattern :**  **Full credit:02**  **Partial credit:01**  **No credit:0** |

**Description of Answer Key and Credits**

Full credit: 2, length=area /width=(x2 – x -2)/(x+3),

Partial credit: length=area /widthNo credit: For any other response

No credit: For any other response

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|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **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 x2 +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**

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

No credit: For any other response

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **13.1.Delicious and Decorative Delight** | | |



13. A new backery offers decorated sheet cakes for parties and other occassions. The backery wants the volume of a small cake to be 351 cubic inches. The cake is in the shape of a rectangular solid. The lengthof the cake is 4 inches longer than the width and height of the cake is 1/3rd of the width.

13.1. Write a polynomial expression representing the volume.

**Mathematical Literacy**

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| **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: (x3+4x2 =1053), Partial credit: 0

No credit: For any other response

No credit: For any other response

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **13. 2.Delicious and Decorative Delight** | | |

13. A new backery offers decorated sheet cakes for parties and other occassions. The backery wants the volume of a small cake to be 351 cubic inches. The cake is in the shape of a rectangular solid. The lengthof the cake is 4 inches longer than the width and height of the cake is 1/3rd of the width.

13.2. What are the dimensions of the cake?.



**Mathematical Literacy**

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

No credit: For any other response

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| **D:\pisa\peacock .jpg14. 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 pounches upon it.

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

**Mathematical Literacy**

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| **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 ,

Partial credit:0

No credit: For any other response

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|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS**  **CONTEXT : 11-1** | **Class: X**  **Expected time: 3 minutes**  **Total credit:02** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  Students are expected to identify the nature of a polynomial function. | |
| D:\pisa\peacock and snake.jpg**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 burrogh towards rat. Seeing the snake the peacock pounches 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

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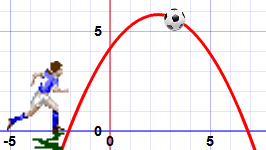
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|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 3minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |





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**

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| --- | --- |
| **FRAMEWORK** | **CHARACTERISTICS** |
| 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 – 5t2

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

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

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|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

27.2 Find the zeroes of the polynomial 3+14t – 5t2 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

|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

27.3 Find the maximum height the ball reaches?

**Mathematical Literacy**

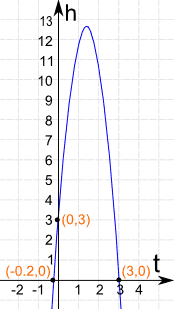
|  |  |
| --- | --- |
| **FRAMEWORK** | **CHARACTERISTICS** |
| Competency cluster | employing mathematical concepts |
| Overarching Idea | Space and Shape |
| Context | Scientific |
| Item Format | Short Answer |
| Cognitive process | Skill |
| Proficiency Level | 3 |

**Full credit: 02 Maximum** height h= 13m (approx.)

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

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

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| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 1 minute**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | | **🗸** | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

27.4 Mention the name of the graph in the given figure

**Mathematical Literacy**

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

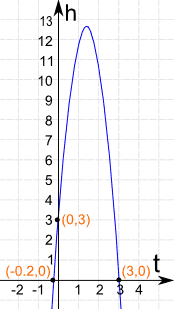
**Full credit: 02** Parabola

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

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

|  |  |  |
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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 1 minute**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | |  | **Image** | |  | **Table** | | **🗸** | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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



**Mathematical Literacy**

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| **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= 13m ( between 12 and 13 )

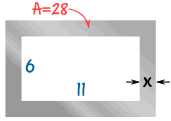
**Partial credit: -----**

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

**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 cm2.** 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**

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

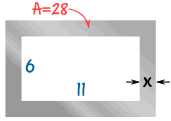
**Full credit: 02** 4x2 + 34 x +66 and degree is 2

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

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial |

28.2 Find the zeros of the polynomial for the area of steel after cutting out the 11 × 6 middle



**Mathematical Literacy**

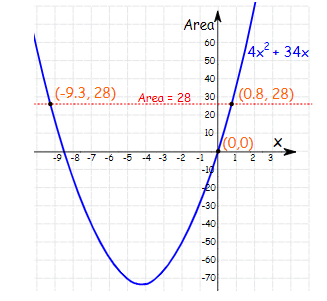
|  |  |
| --- | --- |
| **FRAMEWORK** | **CHARACTERISTICS** |
| Competency cluster | employing mathematical concepts |
| Overarching Idea | Space and Shape |
| Context | Scientific |
| Item Format | Short Answer |
| Cognitive process | Skill |
| Proficiency Level | 2 |

**Full credit: 02** x=0 and x =

**Partial credit: 01** 4x2 + 34x

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

|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:1 minute**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | | **🗸** | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

28.3 From the graph find the value of x.

**Mathematical Literacy**

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

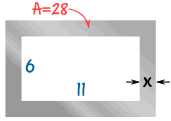
**Full credit: 02** x=0 and x =

**Partial credit: 01** x = 0

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

|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:1 minute**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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



**Mathematical Literacy**

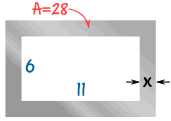
|  |  |
| --- | --- |
| **FRAMEWORK** | **CHARACTERISTICS** |
| Competency cluster | employing mathematical concepts |
| Overarching Idea | Space and Shape |
| Context | Scientific |
| Item Format | Short Answer |
| Cognitive process | Skill |
| Proficiency Level | 1 |

**Full credit: 02** 336 square inches

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

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

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| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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

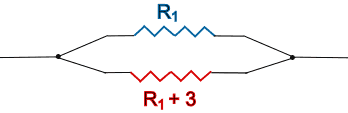
**Partial credit: 01**  2(2x+11+2x + 6) + 2 x 17

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

|  |  |  |
| --- | --- | --- |
| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

## 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 R2 is known to be 3 ohms more than the other. The formula to work out total resistance "RT" is:

29.1 What is the relation between  If  is 7Ohms what is 

**Mathematical Literacy**

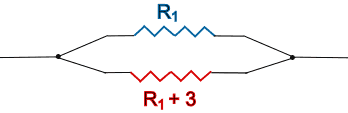
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| **FRAMEWORK** | **CHARACTERISTICS** |
| Competency cluster | employing mathematical concepts |
| Overarching Idea | Space and Shape |
| Context | Scientific |
| Item Format | Short Answer |
| Cognitive process | Skill |
| Proficiency Level | 3 |

**Full credit: 02**  R2 = R1 + 3 and R1 = 4 ohms

**Partial credit: 01**

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

29.2 Form a Quadratic equation in .

**Mathematical Literacy**

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

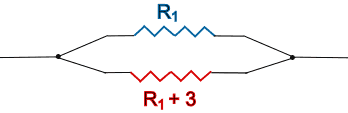
**Full credit: 02** x2 – x – 6 = 0 where x = R1

**Partial credit:** 01

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

29.3 What are the values of the two resistors?



**Mathematical Literacy**

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| **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**  R1 = 3 and R2 = 6

**Partial credit: 01**  R1 = 3 or R1 = -2

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:1 minute**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

**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) = 0.3t3 – 5t2 + 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**

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

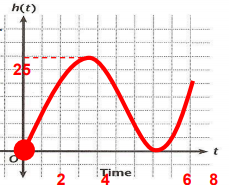
**Full credit: 02**  Cubic Trinomial

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

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:1 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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**

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| **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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:2 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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

**Mathematical Literacy**

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| **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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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

**Mathematical Literacy**

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| **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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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**

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| **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:

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

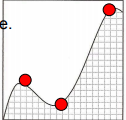
**No credit: 00 :**other response / no response

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | | **🗸** | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

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**

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| **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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 5 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner develops a relationship betweenalgebraic and graphical methods of finding the  zeroes of a polynomial | |

30.7 David wants to find out when the coaster dips below the ground. Identify all the zeros of

h(t) = -2t3 + 23t2 – 59t + 24. Clearly interpret the real-world meaning of these zeros.

**Mathematical Literacy**

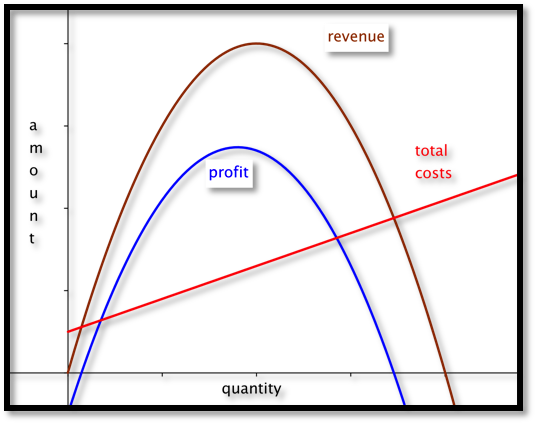
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| **FRAMEWORK** | **CHARACTERISTICS** |
| Competency cluster | employing mathematical concepts |
| Overarching Idea | Space and Shape |
| Context | Scientific |
| Item Format | Short Answer |
| Cognitive process | Skill |
| Proficiency Level | 6 |

**Full credit: 06** REAL ZEROES are: h( ½) =0 , h(3) = 0 , h(8) = 0 The coaster went into the tunnel at ½ 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

* 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.mit will bring in ‘m’ more customers. Write an expression for the cost of each discounted ticket.

**Mathematical Literacy**

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| **FRAMEWORK** | **CHARACTERISTICS** |
| 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**

**Full credit: 02**  7- m ;

**Partial credit: 01** No partial credit

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

Name of the Teacher/Item Writer: K. Mahadevan

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time: 3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner identifies or classifies polynomialsamong algebraic expressions and also factorisesthem by applying appropriate algebraicidentities. | |

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**

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| **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: 50m2+380m+4480**

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

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

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| **Domain: Mathematics literacy** | **Theme:POLYNOMIALS** | **Class: X**  **Expected time:3 minutes**  **Total credit: 2** |
| **Description of Item**   |  |  | | --- | --- | | **🗸** | **Text** | | **🗸** | **Image** | |  | **Table** | |  | **Graph** | |  | **Map** | |  | **Poem** | | **Learning outcome:**  **(as per NCERT)**  The learner identifies or classifies polynomialsamong algebraic expressions and also factorisesthem by applying appropriate algebraicidentities. | |

**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**

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| **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) = x3+6x2+8x

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

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