A Compilation of Creations and Contributions by STEM HeadStarter Students
# About HeadStart STEM

Headstart STEM is United Way Mumbai’s education enhancement initiative, bringing STEM education to children from 15 municipal and low-income schools in Mumbai's F-North and F-South Municipal wards. The initiative aims to encourage scientific thought and learning among children from 1st to 10th grades, especially girls, through various interventions throughout the academic year. It also promotes the pursuit of STEM related careers to the children. Additionally, professional teachers from low-income and government schools are also engaged to promote new thinking within the classroom and build capacities.

**HeadStart STEM aims to:**
- Create an enabling environment for students to succeed.
- Develop and enhance STEM learning outcomes through innovative educational materials and infrastructure.
- Engage community stakeholders to ensure enrolment retention and quality education.

<table>
<thead>
<tr>
<th><strong>Impact of the HeadStart STEM Interventions:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>15 schools equipped with digital learning support for children from Grades 1-5</td>
</tr>
<tr>
<td>300+ children participated in STEM camps</td>
</tr>
<tr>
<td>10 Mini Science Centres set up to promote hands-on STEM learning</td>
</tr>
<tr>
<td>15 classroom STEM libraries to encourage a love for reading and STEM</td>
</tr>
<tr>
<td>1000+ children part of STEM exposure visits</td>
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<tr>
<td>Remedial education in Mathematics for 1000+ children from Grades 1-5</td>
</tr>
<tr>
<td>Goal setting, time management, career mapping &amp; guidance for 330+ girls</td>
</tr>
<tr>
<td>Around 400 Grade 10 children participated in Career Fair for guidance on STEM careers</td>
</tr>
<tr>
<td>Monthly STEM newsletters circulated</td>
</tr>
<tr>
<td>1050 children part of Anvesha: A STEM Carnival to promote experiential learning</td>
</tr>
</tbody>
</table>
STEM HeadStarters

The STEM HeadStarters is a monthly newsletter for the children, by the children. Every month, children share a host of entries comprising fun facts, Maths tricks, STEM news, experiments to try at home, information about famous personalities and trends in STEM fields. The shortlisted entries are then featured in the newsletter. The STEM HeadStarters offers children a platform to share knowledge and learn from peers, while fostering a spirit of competition as children compete among themselves to get their entries featured.

This book is a compilation of the children’s creations and contributions to STEM HeadStarters over the academic year 2018-2019. The newsletters are not only an informative resource, but are also evidence of the children’s interest and involvement in generating them every month.

We are grateful to all our partner schools for their participation and support throughout the year.

1. Dr. D.B. Kulkarni Vidyalaya
2. Guru Nanak High School
3. S.S.M. M.C.M. Girls’ High School
4. Lion Mohanlal Parmanand Bhuta Sion Sarvajanik School
5. SVB’s U.M. Thevar School
6. Ahilya Vidyamandir
7. Shishu Vihar Madhyamik Vidya Mandir
8. Karmaveer Bhaurao Patil Vidyalaya
9. Navbharat Vidyalaya
10. Pratiksha Nagar MNP Marathi School No. 2
11. Haji Ismail Haji Allana Marathi School
12. Nadkarni Park Marathi School No. 3
13. K. D. Gaikwad Marathi School No. 1
14. New Sion Municipal Secondary School- Hindi
15. New Sion Municipal Secondary School- Marathi
THE “EXPLORERS, OBSERVERS, THINKERS, PROBLEM SOLVERS”

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- And many more fun filled activities

5 FASCINATING FACTS ABOUT THE HUMAN BODY

- It is impossible to sneeze with your eyes open. [Source: goodnumber.com]
- There are ten times more bacteria cells in your body than human cells. [Source: ehow.com]
- Over the course of just one day, our blood ‘runs’ the distance of 19,312 kilometers. [Source: ehow.com]
- The heart beats 35 million times a year. Yes, 35 million. A year! [Source: headmotions.org]
- When you blush, the inside of your stomach does too. [Source: headmotions.org]

ORDERING MATHEMATICAL OPERATIONS

7 + (6 x 5² + 3)

What do we do first? Order of operations:
- Do things in Brackets first
7 + (6 x 5² + 3)
- Solve Orders
7 + (6 x 25 + 3)
7 + (150 + 3)
- Divide OR Multiply (whichever comes first)
7 + (153)
= 7 + 153
= 160

How do I remember it all?

BODMAS

Brackets, Orders, Division, Multiplication, Addition, Subtraction

Amaze your friends with this demonstration of centripetal force:
- Tornado in a bottle experiment
- Add water to a bottle
- Add a little dish soap
- Add a pinch of glitter
- Close the bottle
- Hold the bottle upside down and shake it as fast as you can in a circular pattern for 20 seconds

You will see a tornado beginning to form!
Why does this happen?
Centripetal force acts on the bottle when it moves in circular motion. This is what catches the glitter and makes it move.

Attention Everybody!!!
Let’s write for September together...
Do you love to draw, colour, write, read about new things and explore?
Then come write for STEM Headstarters!

You can share:
- Interesting facts
- Experiments you have conducted
- Mini Science Centre models you like
- Math tricks you know
- Famous personalities you like
- Movies you have watched

And anything else from the world of STEM! Give your drawings and writings to your class teacher by 16th September.

Send in your entries via email to Aishwarya Iyer or Monika Gurusinghapawar at headstart.stem@unitedwaymumbai.org
Or call us on +91 22 24937676 / 80-82, 63378967 / 8

United Way Mumbai
309, Nirman Kendra, Famous Studio Lane, Off Dr. E. Moses Road, Mahalaxmi Estate, Mumbai 400 011
Students’ Contributions
September - October, 2018

Savita Paswan from Grade 8, U.M.T. High School found these fascinating facts for our Newsletter.

Shubham from Grade 7, U.M.T. High School sent us this amazing Maths Trick!
**STEM HeadStarters**

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**Maths Tricks**

How to multiply numbers easily

E.g. 57 x 24

1. Write one number vertically and one number horizontally
   - 5 7
   - 2 4

2. Draw a box between the numbers and divide it into 4 parts
   - 2 4
   - 5 7

3. Draw a slanting line in each part of the box
   - 2 4
   - 5 7

4. Multiply each digit of the vertical number with each digit of the horizontal number.
   - 2 x 5 = 10
   - 2 x 7 = 14
   - 5 x 4 = 20
   - 4 x 7 = 28

5. Then add the digits that are in the same slanting line starting from the digit at the bottom right.
   - 1 + 0 + 2 + 3 = 6
   - 1 + 4 + 2 + 0 = 7
   - 2 + 8 = 10
   - 2 + 8 = 10

The answer is 1368

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**DID YOU KNOW?**

- Bees must collect nectar from 2 million flowers to produce one pound of honey.
  - Savita Pashwan, Grade 8, U.M.T. High School

- Saturn’s density is low enough for it to float in a large body of water.
  - Shubham Vaishya, Grade 7, U.M.T. High School

- The tongue of a blue whale can weigh as much as an elephant.

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**Eggceptional Powers!**

You will need:
1. 2 transparent glasses
2. 6 glasses of salt
3. 2 eggs
4. Water

Follow these steps:
1. Pour warm water into the glasses till they are \( \frac{3}{4} \) full
2. See the start of the glasses until it completely dissolves
3. Place an egg in each glass carefully

What do you see?
The egg sinks in fresh water but floats in salt water.

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**Attention Everybody!!!**

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You can share:
- Interesting facts
- Experiments you have conducted
- Famous personalities you like
- Mini Science Centre models you like
- News you have watched

And anything else from the world of STEM! Give your drawings and writings to your class teacher by 31st October

**OR**

Send your entries via email to Aishwarya tyor or Monika Gurnaseighani at headstartstem@unitedwaymumbai.org

Or call us on +91 22 20437667 / 25-82-62338967 / 7

**OR**

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**विज्ञानकविता**

काढली ह्यातील तसा व विज्ञानात पर्यंत नाही या विज्ञानात पर्यंत नाही वा भाग्यपूर्व करणे नाही भाग्यपूर्व करणे नाही आणि ती हा जीवन सर्वात सर्वात विश्वसनीय वातावरण सापडत होतो जिथे यांच्या सर्वांनी सर्वांनी वातावरणात असल्याचा सुमार होऊ शकतो असल्याचा सर्वांनी आकाशातून फिर्तील फिर्तील तारांपासून आकाशातून या महाबुध्धात आकाशातून वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात वातावरणात

निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे निविष्कारणात शोधात सेवी ज्ञान सारे

- Grade 4, Shrishankar Madhyanik Shela

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**Why does this happen?**

The force of gravity pulls objects downwards. But water exerts an upward force called buoyancy (like air). Salt water has greater buoyancy than fresh water, so it pushes the object upwards. Hence, the egg floats in salt water while it sinks in fresh water.
Students’ Contributions
November, 2018

Tanishq Gaware, Grase 5, Guru Nanak High School showed us his interest in astronomy with this snippet

Vedant Desai, Grade 7, Dr. D.B. Kulkarni Vidyalaya shared this cool Maths trick
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STEM Jobs

Who is an astronaut (अंतराजातीय)?
An astronaut is a person who travels in outer space (अंतरिक्ष). Astronauts can pilot, command or work as a crew member on a spacecraft (अंतरिक्ष यात्री). They gather information about other stars and planets (चारण आण्यांचा विश्वास). For protection in space, they wear spacesuits (स्पेस सूट) that allow them to breathe.

Rakesh Sharma was the first Indian astronaut to go into space in 1984. He spent eight days on a space station. When he saw India from space, he said, ‘सारों जहां से अंधाण हिंदुस्तान है’

DID YOU KNOW?

- An ostrich’s eyeball is bigger than its brain.
- Dolphins sleep with one eye open.

- Savita Paswani
Grade 8, U.M. Thevar High School

- Vedant D. Desai
Grade 5 A, Dr. D.B. Kulkarni Vidyalaya

Maths Tricks

Impress your friends with some maths magic by asking them to follow these steps!

Step 1.
Think of any digit lower than 10

Step 2.
Multiply (गुणन) your number by 2

Step 3.
Add (योग) 6 to your multiplied number

Step 4.
Divide (भाग) the number by 2

Step 5.
Subtract (घन) the number you thought of in Step 1 from the number you got in Step 4

The answer will be 3, no matter what number your friend chooses in Step 1!

- Tanusha Gawate
Grade 5 A, Guru Nanak High School

Visaan

विद्यार्थी : विबेक कुलसंगीत

Attention Everybody!!!

Let’s write for December together ...
Do you love to draw, colour, write, read about new things and explore? Then come write for STEM HeadStarters!

You can share:
- Interesting facts (संदर्भाने माहत्तूली)
- Famous personalities
- Experiments (अभियांत्रिकी) you have conducted (कैसे काढली अभियांत्रिकी)
- Math (मॅथ्स) tricks you know
- News (माहिती) you have watched

And anything else from the world of STEM! Give your drawings and writings to your class teacher by 5th December

Send your entries via email to Aishwarya Iyer or Manika Gunasimanghi at headstartstem@unitedwaymumbai.org
Or call us on +91 22 26437876 / 90-92, 62379687 / 8

United Way Mumbai
309, Nirman Kendra, Famous Studio Lane, Off Dr. E. Moses Road, Mahalaxmi Estate, Mumbai 400 011
Janavi Vinod Adangale from Std. VII, Div. A, Guru Nanak High School sent us these fun facts about volcanoes.

1. The chemical substances such as lava, vapours, hot, mud, sulphurs, etc get collected on the surface of the earth and thereby mountain and hills are created.
2. The atmosphere gets polluted due to the ash and gases ejected by the volcano.
3. Often, it rains as a result of a volcanic eruption.
4. Temperature rises due to hot gases.
5. Forests and settlements get buried under the hot mud.

Sanobar Naim Khan from M.P. Bhuta School shared some knowledge on Chemistry for the newsletter.

Which gas evolved from paddy fields and marshes?
- Methane

Who invented periodic table?
- Dmitri Mendeleev
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- Dmitri Mendeleev, a Russian chemist, created the periodic table.

- Methane gas evolved in rice fields and marshes.

- Diamond is the purest form of carbon

- Sanobar Naím Khan
  M.P. Bhuta School

**Did You Know?**

- Chemical substances like lava, vapour, hot mud, sulphur, etc. are collected on the earth’s surface, helping create mountains and hills.
- The atmosphere gets polluted due to the ash and gases ejected by the volcano.
- Often, it rains as a result of a volcanic eruption.
- The particles released during a volcanic block sunlight and cool the Earth.
- The temperature also rises due to hot gases over millions of years.
- Forests and settlements get buried under the hot mud.

- Janani Vinay Adangale
  Std VII, Div. A, Guru Nanak High School

**Effects of Volcanic Eruptions**

- Chemical substances like lava, vapour, hot mud, sulphur, etc. are collected on the earth’s surface, helping create mountains and hills.
- The atmosphere gets polluted due to the ash and gases ejected by the volcano.
- Often, it rains as a result of a volcanic eruption.
- The particles released during a volcanic block sunlight and cool the Earth.
- The temperature also rises due to hot gases over millions of years.
- Forests and settlements get buried under the hot mud.

**Attentive Everybody!!!**

Let’s write for January together...
Do you love to draw, colour, write, read about new things and explore? Then come write for STEM HeadStarters!

You can share:
- Interesting facts (जनतक से संबंधित तथ्य)
- Famous personalities
- Experiments (विज्ञानीय अभियांत्रिकी)
- Math tricks you know
- News (न्यूज़) you have watched

And anything else from the world of STEM? Give your drawings and writings to your class teacher by 10th January

OR

Send in your entries via email to AshwiniIyer or
Monika Gurnasinghani at headstart.stem@unitedwaymumbai.org
Or call us on +91 22 23937676 / 90-82, 6337670 / 78

OR

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**Students’ Contributions**

**January 2019**

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**Do you Know?**

Goldfish have only three Second Memory they lost their name.

Snails are slipping three years.

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Simran Pawar from Grade 8, S.S.M. Shivaji Vidyalaya showed us her knowledge of the natural world for the January edition.

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Shraddha Devkar from Grade 8, S.S.M. Shivaji Vidyalaya know amazing tips to make number tables easy.

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Namira Sandogar from Grade 6, S.S.M. Shivaji Vidyalaya gave us some news from the world of STEM.
STEM HeadStarters

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DID YOU KNOW?

There are more than 1,300 bat species distributed across six continents.

- Tanvi Prakash Zopade
  Grade 8, S.S.M. Shivaji Vidyalaya

Goldfish see more color than humans.

- Simran Pawar
  Grade 8, S.S.M. Shivaji Vidyalaya

EXPERIMENT

STEM Around the world...

Electricity (विद्युत्) producing bacteria (वैद्युतिक बैक्टीरिया) have been found in the human stomach. This bacteria transport electrons (विद्युत तन्त्र) through their cell wall into the environment as tiny currents, assisted by molecules (वस्तु). This could prove to be a useful technology to generate electricity from bacteria in waste treatment.

- Namira Yuusuf Saudagar
  Grade 6 B, Gaur Nanak High School

Maths Trick for 2 digit Number Tables

Do you know the times table for 24? No? Here's a helpful trick:
You can easily write the table of 24 with the tables of 2 and 4.

Step 1: Write tables of both digits, ‘2’ and ‘4’ side by side

<table>
<thead>
<tr>
<th>2X</th>
<th>4X</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>04</td>
</tr>
<tr>
<td>04</td>
<td>08</td>
</tr>
<tr>
<td>06</td>
<td>12</td>
</tr>
<tr>
<td>08</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

Step 2: Bring the table of 2 and table of 4 together like this!

<table>
<thead>
<tr>
<th>2X</th>
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<tr>
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<tr>
<td>10</td>
<td>24</td>
</tr>
</tbody>
</table>

- Devbar Shradhika Suresh
  Grade 8 B, S.S.M. Shivaji Vidyalaya

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- Interesting facts (प्रश्नात्तथात् पररस्भव)
- Famous personalities
- Experiments (शिक्षण) you have conducted
- Maths (मैथ्स) tricks you know
- News (खबर) you have watched

And anything else from the world of STEM!

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OR

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Students’ Contributions
February 2019

Do You Know?

On average, cats spend 2/3 of every day sleeping.
That means a nine-year-old cat has been awake for only three years of its life.

Elephants do forget, but it takes years. An elephant can remember its mother’s scent, the call of close female family members, relationships with humans, and migration routes to food and water resources for decades at a time.

Reptiles are a class of cold-blooded vertebrates covered in special skin made up of scales, bony plates, or a combination of both. They include crocodiles, lizards, snakes, turtles, and tortoises. They usually shed the outer layer of their skin. Their metabolism depends on the temperature of their environment.

Reptiles are cold-blooded vertebrates (vertebrates have backbones). They have dry skin covered with scales or bony plates, and usually lay soft-shelled eggs. Want to see alligators? Check out mammals, birds, amphibians, fish, insects, and dinosaurs too!

Name: Laksha Dhiraj Solanki
Std: VI/A
Roll No: 37

These interesting snippets were shared with us by Tanvi Prakash Zagade from Grade 8, S.S.M. M.C.M Girls’ High School

Laksha Dhiraj Solanki from Grade 6A, Gurunanak High School is an expert on Reptiles
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**DID YOU KNOW?**

- A group of owls is called a “parliament”
  [Source](https://en.wikipedia.org/wiki/Parliament_of_animals)

- The largest kangaroo in the world is the Red Kangaroo
  [Source](https://en.wikipedia.org/wiki/Red_Kangaroo)

- On an average, Cats spend 2/3 of every day sleeping
  [Source](https://www.factsaboutdogs.com/facts-cats-spend-2-thirds-every-day-sleeping)

**MATHS TRICK FOR CALCULATING PERCENTAGE**

Let's calculate any percentage in your head with this simple trick

1. Let's try it with 5% of 235

**Step 1.**
Divide the number 235 by 10, which gives 23.5.

**Step 2.**
Divide the answer 23.5 by 2, which gives 11.75.

**Step 3.**
11.75 is the answer to 5% of 235

—Tamil Prakash Zagade
Grade 8 B, SSM Shiviagi Vidyalaya

**EXPERIMENT**

Reptiles are tetrapod animals in the class Reptilia, comprising today's turtles, crocodilians, snakes, amphisbaenians, lizards, tuatars, and their extinct relatives. Reptiles are air-breathing vertebrates covered in a special skin made up of scales, bony plates, or a combination of both. Reptiles include crocodiles, snakes, turtles, tortoises and lizards.

—Lakshmi Dhiraj Solanki
Grade 6A, Garunanaok High School

**REPTILES**

Attention Everybody!!!

Let’s write for March together...
Do you love to draw, colour, write, read about new things and explore? Then come write for STEM HeadStarters!

**You can share:**

- Interesting facts (प्राकृतिक तथ्य)
- Famous personalities
- Experiments (विज्ञान) you have conducted (विज्ञानीय विचार) you like
- Maths (गणित) tricks you know
- News (बाल) you have watched

And anything else from the world of STEM! Give your drawings and writings to your class teacher by 16th March

OR

Send in your entries via email to Aishwarya Iyer or Manika Gurnasinghani at [headstartstem@unitedwaymumbai.org](mailto:headstartstem@unitedwaymumbai.org)

Or call us on +91 922 264 9379/0 60-82, 6537897 9

United Way Mumbai

39, Nirman Kendra, Famous Studio Lane, Off Dr. E. Moses Road, Mahalaxmi Estate, Mumbai 400 011

Students’ Contributions
March and April 2019

We got this cool Maths trick from
Sakshi Ambekar, Grade 9, Ahilya Vidya
Mandir

Simran Pawar from S.S.M. M.C.M.
Girls’ High School shared this amazing
information
STEM HeadStarters
THE “EXPLORERS, OBSERVERS, THINKERS, PROBLEM SOLVERS”

MARCH & APRIL 2019

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DID YOU KNOW?

1. A snail can sleep for 3 years
   - Shraddha Deskar
   Grade 8, S.S.M. M.C.M. Girls’ High School

2. Venus is the only planet that rotates clock-wise
   - Simran Power
   S.S.M. M.C.M. Girls’ High School

3. Houseflies taste with their feet, which are 10 million times more sensitive than our tongue
   - Namrata Yashodhara Sadagar
   Grade 7, Guru Nanak High School

A cracked egg makes a mess on land, but 18 metres below the surface of the ocean, the pressure on the egg is 2.8 times the atmospheric pressure, holding it together like an invisible eggshell

- Kashish Katere
Grade 8 B, S.S.M. M.C.M. Girls’ High School

Your fingernails grow faster in summer than they do during any other season
- Varsha Thawar
Grade 9 A, Ahilya Vidya Mandir

Fun Maths Tricks

1. An easy way to multiply any number by 11

   Example: 32 x 11
   Step 1. 3 2
   Step 2. 3 + 2
   3 5

   And the answer is 352!
   - Esha Chavan
   Grade 7 A, S.S.M. M.C.M. Girls’ High School

2. The answer will always be 371

   Step 1. Choose a 3 digit number with the same digits.
   Let’s go with 333.
   Step 2. Add the digits together.
   So 3 + 3 = 6
   Step 3. Divide the original number with this sum.
   So 333 ÷ 6 = 371

   This works every single time.
   Try it out with your friends!
   - Sachi Ambekar
   Grade 9, Ahilya Vidya Mandir

Study more effectively for your exams:

Semester examinations are around the corner. Here are some tips to help you study better...

- Start studying from the beginning
- Rework book examples
- Make a list of important concepts/formulae
- Write a practice exam
- Get a good night’s sleep before the day of the exam

- Diksha Kale
Grade 9 A, Ahilya Vidya Mandir

For more details, you can send an e-mail to Aishwarya Iyer or Manika Gurnaisingh at headstartstem@unitedwaymumbai.org
Or call us on +91 22 29437676/80-82, 623749978

United Way Mumbai
309, Nirman Kendra, Famous Studio Lane, Off Dr. E. Moses Road, Mahalaxmi Estate, Mumbai- 400 011
Community Newspaper
Conducted by “The Pomegranate Workshop”

The children’s summer vacation was made more fun with an engaging activity to transform their classroom space by integrating multiple arts. Children enjoyed a day out in the community and were then given the task of reporting what they thought about the world around. A clear success, the activity not only made the students aware of various reporting styles, but also gave them a platform to express themselves. Through the reporting format, the students were able to give voice to their problems and insights regarding the community.
Visual Arts and Narrative
Conducted by “The Pomegranate Workshop”

Another fun filled activity that enriched the students’ vacations was the picture-book making workshop. Coinciding with “World Creativity and Innovation Week” and “World Book Day”, the workshop gave students the opportunity to create a picture book detailing their ideas of the adventures of different characters from the community. In addition to being able to creatively express themselves through art and narrative, students also looked at various picture books and artwork. Through the activity they could comprehend the concepts of plot, setting and character, helping them create their own storybooks.
About United Way Mumbai

United Way Mumbai is part of the 130+ year old United Way movement spanning 41 countries worldwide. Our mission is to improve lives by mobilising the caring power of communities to advance the common good.

WHO WE ARE

UNITED WAY MUMBAI

At United Way Mumbai, we strive to address social challenges that are too large or complex for any one organization to solve alone.

Our role is that of the catalyst that drives social change and the glue that binds together the many stakeholders needed to create it.

MISSION

United Way Mumbai improves lives by mobilizing the caring power of communities to advance the common good.

Our work includes projects dealing with Education, Health, Income, Environment, Public Safety and Social Inclusion in urban and rural communities, pan India. We are also the official philanthropy partner of the Tata Mumbai Marathon.
It has been an enriching experience for us to see the children’s increasing interest and engagement in STEM learning. We look forward to being back next year, with more such publications.