Grade 2

A case study

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The beginning

- The student is a US resident of Indian origin.
- The student knows how to count numbers from 1 to 100.
- She doesn’t know how to count in reverse.
- She has difficulty reading and writing even small words.

The start

- Chemistry between the student and the teacher is important.
- We began with two one-hour classes a week, increasing them to three or four.
- We took several steps to help her improve her skills in English, Math, and Science.
- Most importantly, we taught her to:
    - Avoid memorization
    - Enjoy her studies
    - Have fun while learning

What did we do in the next year?

A summary of activities we have done so far. Almost all the links on the following page were created and used specifically for her. As you can see, we did a lot of things.

http://www.xcelvations.com/learn_online

Math

1. Grid: Number Grid
2. Grid: Reverse Numbers
3. Grid: Random Numbers
4. Grid: Number Operation
5. Grid: Add to Ten
6. Addition and Multiplication Are Related.
7. Addition, Multiplication and Division Are Related.
8. Multiplication and Division Are Related.
9. Multiplication and Power Are Related.
10. Multiplication, Power and Log Are Related.
11. Grid: Number Multiples
12. Grid: Multiply to Area
13. Identify Multiple Table
14. Sum to Ten

Science

1. Identify States of Matter
2. More about states of Matter
3. X-ray
4. Living and Non-living Things

Learn Words

1. Identify Objects
2. Identify Numbers
3. See, Hear and Make Words
4. Read Words
5. Hear and Make Words
6. See and Make Words
7. Spelling Bee
8. Identify Category Words
9. Listen, See and Write Words
10. Listen and Write Words

Identify

1. Identify animals
2. Identify plants
3. Identify activities
4. Identify camping
5. Identify science
6. Identify shapes
7. Identify sports
8. Identify stationery
9. Identify icons

English

1. Grid: Random Alphabets
2. Grid: Sort Sentences
3. Rewrite a Sentence
4. Write a Sentence
5. Read a Story (Sentences)
6. Read a Joke (Sentences)
7. Read a Story (Words)
8. Read a Joke (Words)
9. Read a Puzzle and Answer
10. Read a book (Sentences)

General Knowledge

1. Identify Planets
2. Identify Human Body Parts
3. Identify Digestive System
4. Satellite Communication
5. Pond Ecosystem
6. Identify Traffic Signals
7. Food Chains
8. Identify Farm Animals 1
9. Identify Farm Animals 2

Brain Teaser

1. Bigger or Smaller
2. Group Objects
3. Clock and Time

Fun

1. Grid: Sort answer to a joke
2. Grid: Answer a joke
3. Grid: Answer a math joke
4. Grid: Similar or Different
5. Count Dancing Balls
6. Find the Speed
7. Length of Lines

Others

1. Grid: Sortable Grid
2. Grid: Sortable Image
3. Chess Board

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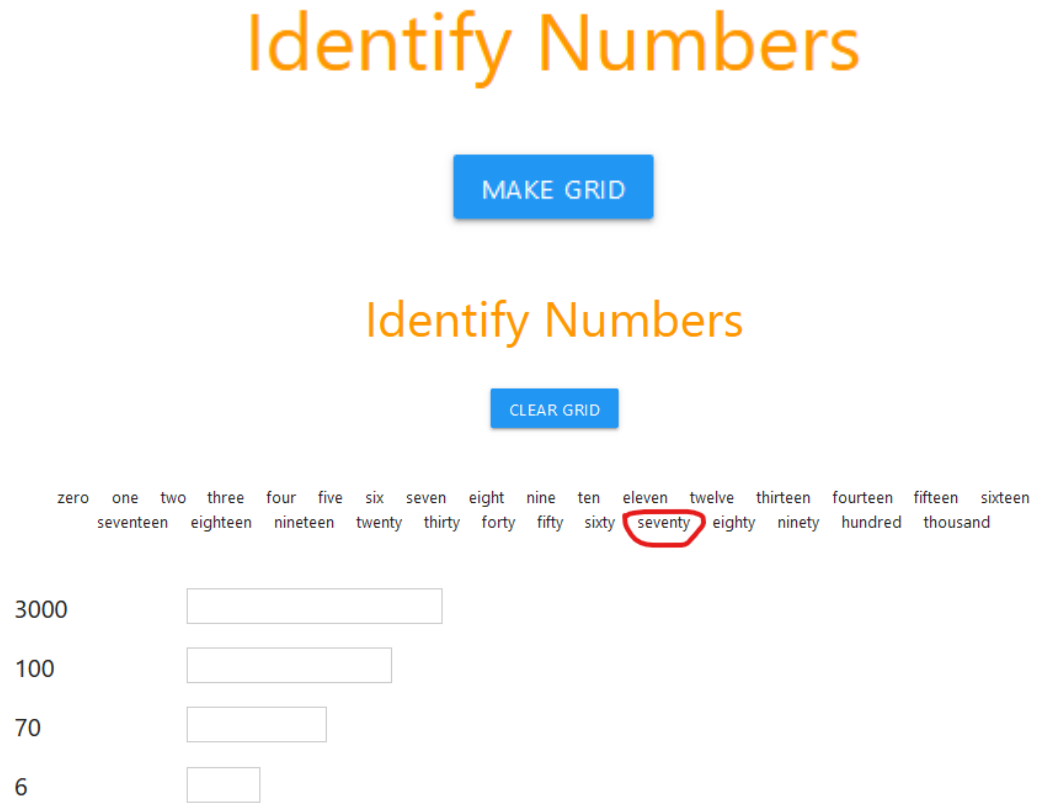
Help at arm’s length

- We created programs that provided all the help needed in a single interface.
- The concepts were broken into pieces but remained interconnected.
- For example, when she could not read a word, voice support was available with a click.
- The AI and algorithm-based content ensure that she gets a new question every time she clicks ‘Make Grid’.



Incremental concept building

Sum to Ten

CLEAR GRID

5 + ☐ = 10

☐ + 3 = 10

Sum two numbers

CLEAR GRID

400 + ☐ = 600

500 + ☐ = 800

Addition and Multiplication Are Related

CLEAR GRID

2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = ☐

2 * 9 = ☐

9 * 2 = ☐

9 + 9 = ☐

7 + ☐ = 28

☐ = 28

☐ = 28

☐ = 28

Make Large Numbers Advanced

CLEAR GRID

1 2 2 1 one thousand two hundred and twenty one

1 1 1 1 one thousand one hundred and eleven

1 2 2 1 one thousand two hundred and twenty one

☐☐☐☐ three thousand five hundred and fifty three

Write Sum Tables

CLEAR GRID

3 = 3

3 + 3 = 6

3 + 3 + 3 = 9

6 = ☐

6 + 6 = ☐

6 + 6 + 6 = ☐

6 + 6 + 6 + 6 = ☐

6 + 6 + 6 + 6 + 6 = ☐

Multiplication, Power and Log Are Related

CLEAR GRID

2 * 2 * 2 = ☐

2 ** 3 = ☐

log 8 on base 2 = ☐

3 * 3 = ☐

3 ** 2 = ☐

log 8 on base 3 = ☐

4 * ☐ = 16

☐ = 16

☐ = 2

☐ = 16

☐ = 16

☐ = 4

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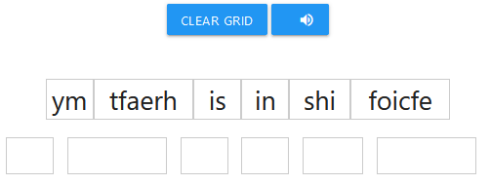
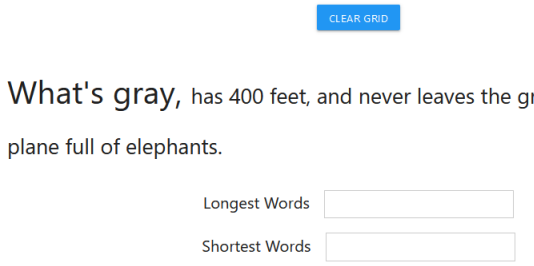
We did it for English.

Game: Sort Sentences

Game: Rewrite a Sentence

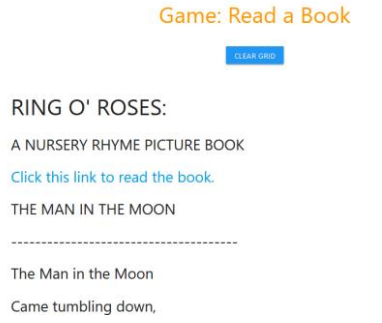


Read a Puzzle and Answer

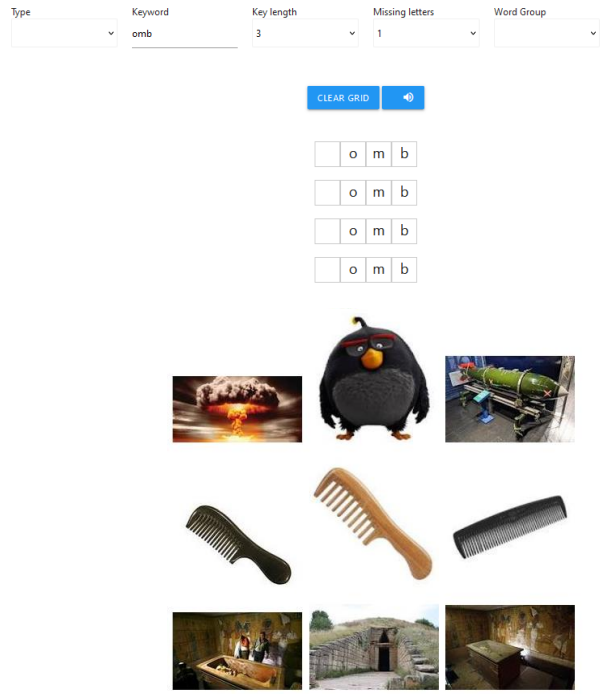


Every word is clickable and produces sound so that students can read them easily.

Game: Read a Book



See, Hear and Make Words



Game: Read a Story (Words)

Two friends and the Bear

Once, there were two friends who were crossing the jungle.
After some time, they saw a bear coming towards them.

Then, one of the friends quickly climbed the nearby tree, and the other one did not know how to climb the tree.

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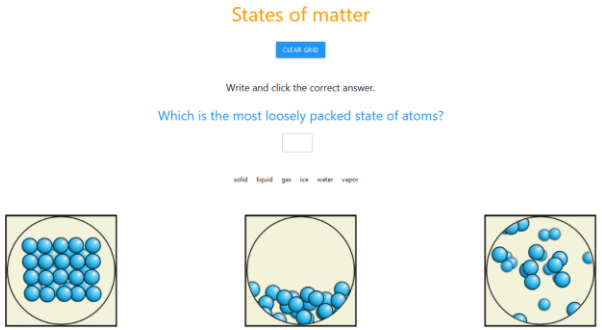
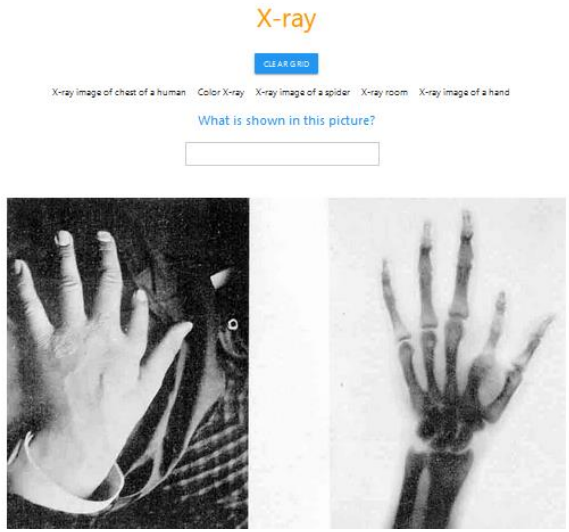
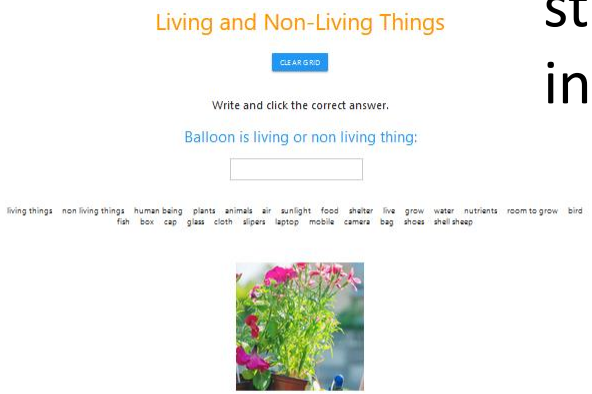
Don’t forget that everything in this document is the work of one year by a student who started with very basic skills and was like any other student of her age.

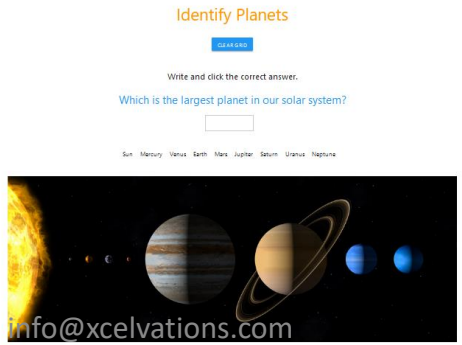
We did for other subjects too!

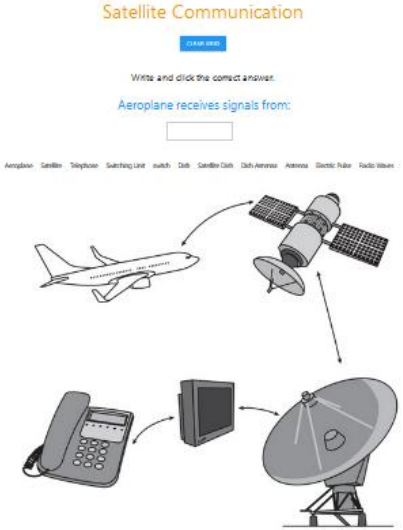


Clicking on text or any object provides voice information to the students, helping them understand things better and answering their questions. We eliminate memorization with a strong emphasis on learning interwoven concepts.









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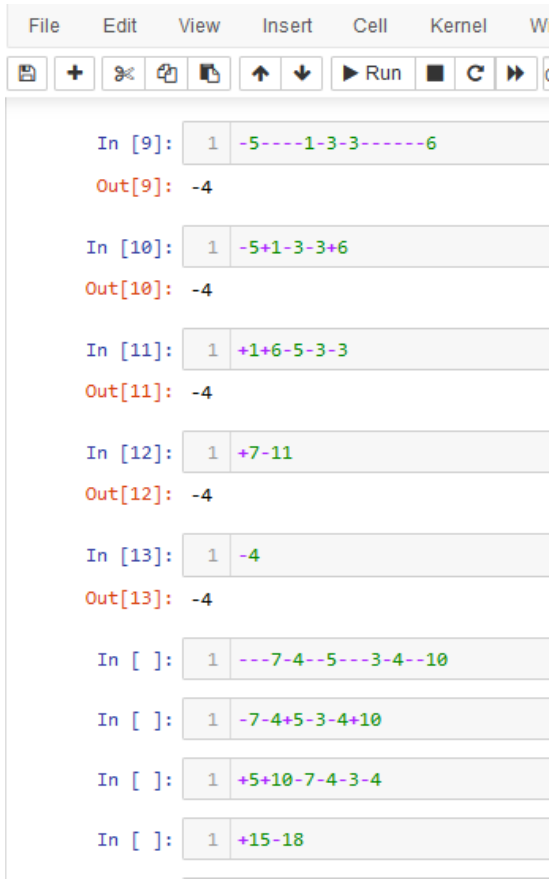
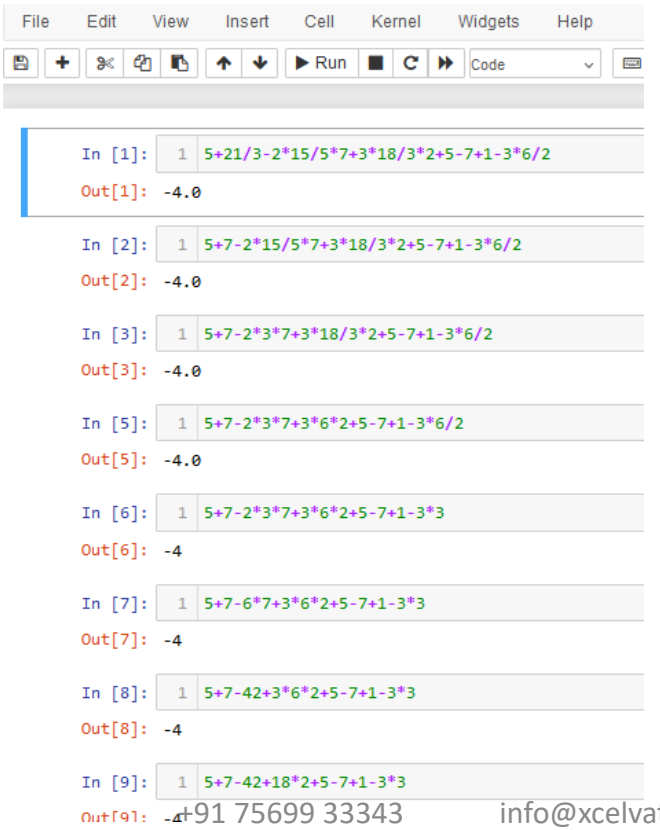
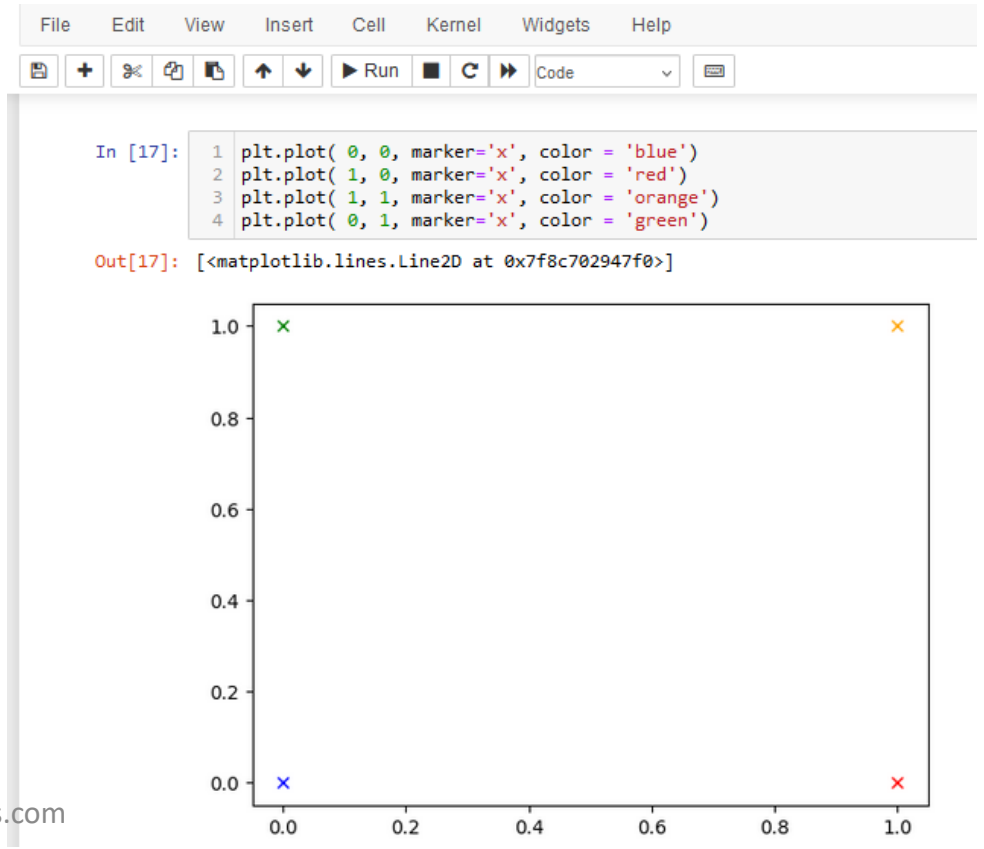
Even second-grade kids can write programs and learn from them.

They learn basic arithmetic and other subjects using the Jupyter Notebook interface. This allows them to run expressions and check the results with their own calculations. If they make a mistake, they can retry. This empowers them to take control of their learning.







More programming

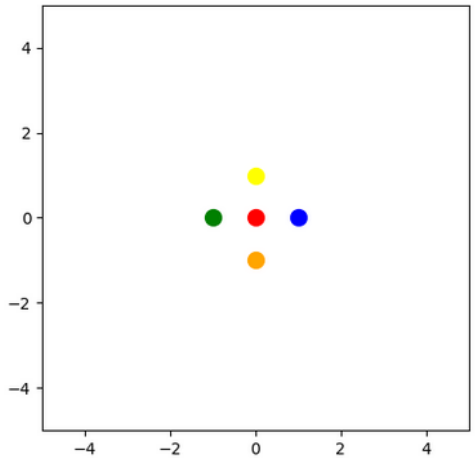
The emphasis isn't solely on programming, but rather on understanding concepts such as size, shape, color, and movement of objects in various directions, which leads to an understanding of the coordinate system. Students receive a basic code and are encouraged to experiment and explore on their own.

File Edit View Insert Cell Kernel Widgets Help

Run Code

In [35]:

```
plt.plot(0, 0, marker = "o", markersize = 10, color = 'red'   )
plt.plot(1, 0, marker = "o", markersize = 10, color = 'blue'   )
plt.plot(-1, 0, marker = "o", markersize = 10, color = 'green'   )
plt.plot(0, 1, marker = "o", markersize = 10, color = 'yellow'   )
plt.plot(0, -1, marker = "o", markersize = 10, color = 'orange'   )

plt.xlim(-5,  5)
plt.ylim(-5,  5)
plt.gca().set_aspect('equal')
```

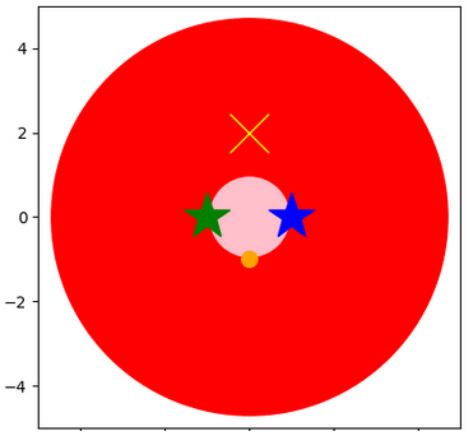


File Edit View Insert Cell Kernel Widgets Help

Run Code

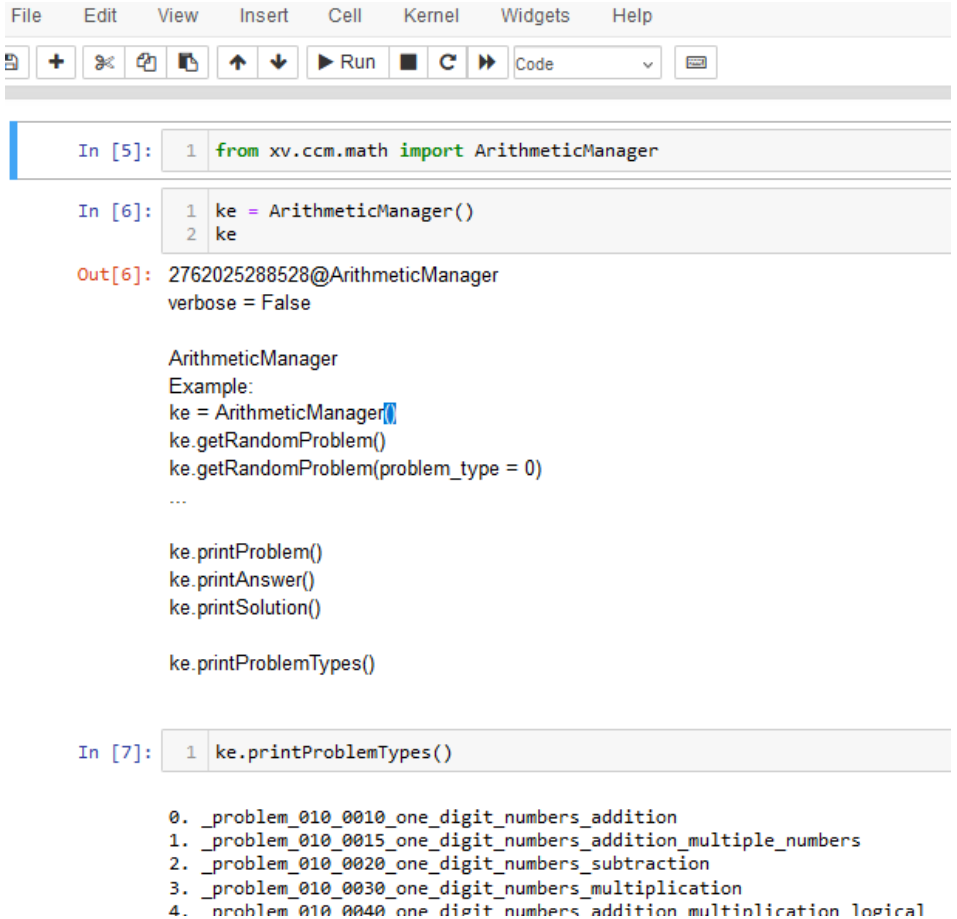
In [51]:

```
plt.plot(0, 0, marker = "o", markersize = 250, color = 'red'   )
plt.plot(0, 0, marker = "o", markersize = 50, color = 'pink'   )

plt.plot(1, 0, marker = "*", markersize = 30, color = 'blue'   )
plt.plot(-1, 0, marker = "*", markersize = 30, color = 'green'   )
plt.plot(0, 1, marker = "x", markersize = 25, color = 'yellow'   )
plt.plot(0, -1, marker = "o", markersize = 10, color = 'orange'   )

plt.xlim(-5,  5)
plt.ylim(-5,  5)
plt.gca().set_aspect('equal')
```



We have developed our own software to accelerate the learning process.

- The user interface is web-based or through Jupyter Notebook. We initially begin with the web interface but swiftly transition to Jupyter Notebook.
- The content is designed to facilitate rapid learning, focusing on interconnected concepts to eliminate the need for
  - memorization,
  - homework, and
  - additional practice.



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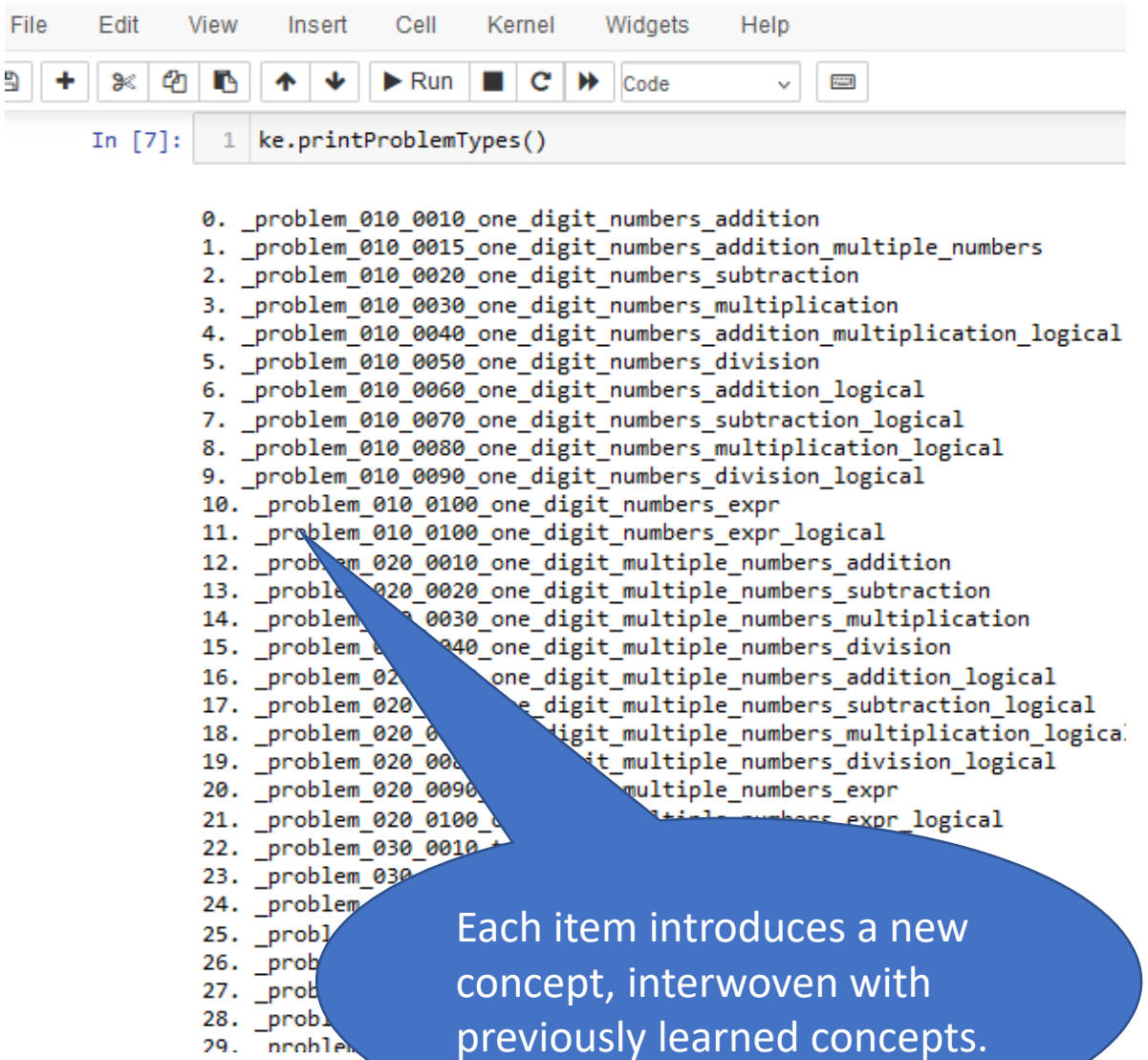
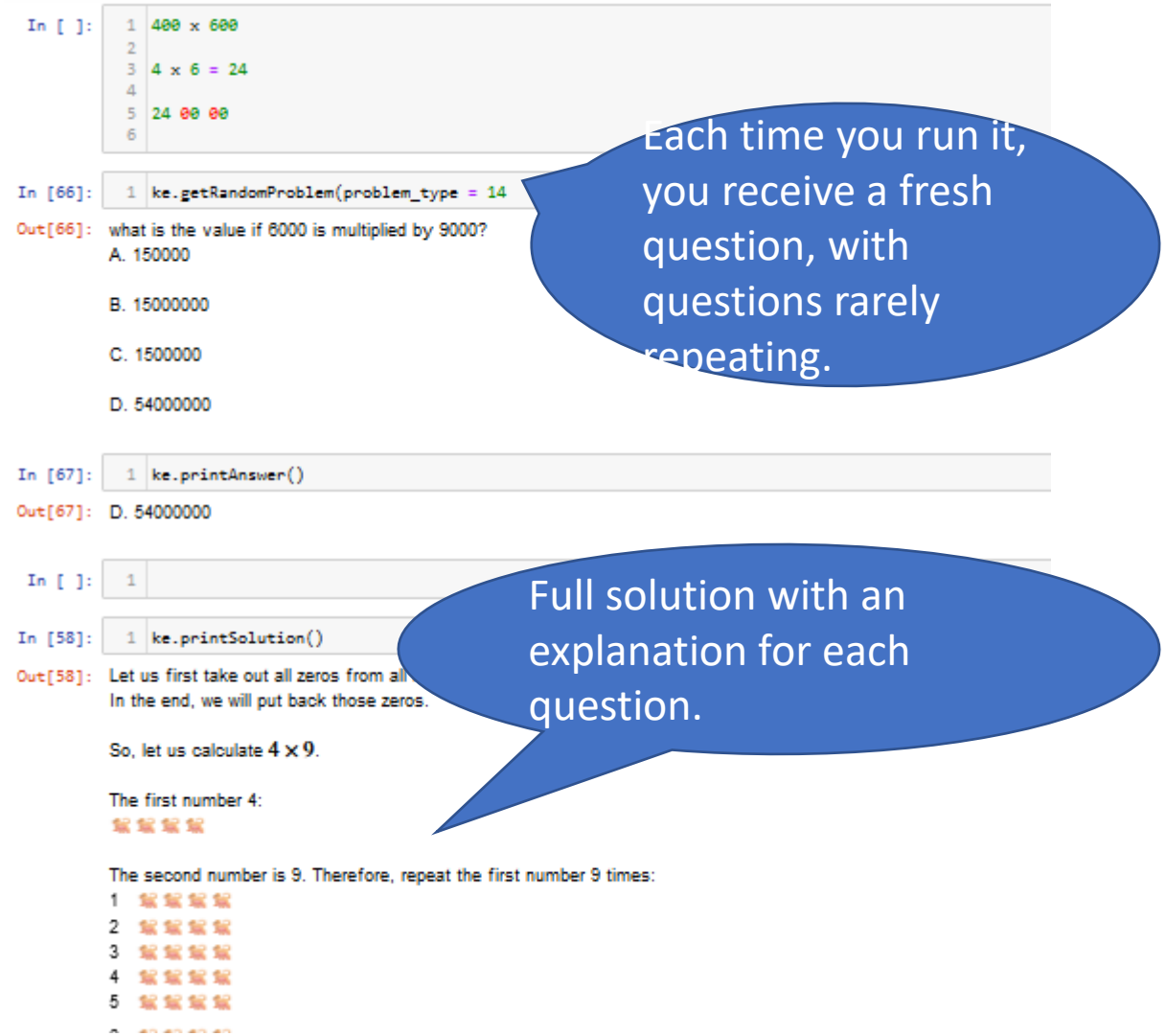


Each item introduces a new concept, interwoven with previously learned concepts.



Each time you run it, you receive a fresh question, with questions rarely repeating.

Full solution with an explanation for each question.

Climbing conceptual ladders

- Students ascend conceptual ladders, akin to progressing in video games.
- Traditional educational approaches, such as those found in schools and books, typically introduce concepts, offer examples, exercises, and tests to master a few concepts before advancing to the next, resulting in a slow-paced process.
- In contrast, our approach accelerates the introduction of concepts and begins each session with foundational concepts to ensure comprehensive internalization of all material.

ArithmeticManager

Question 1.

If you bought ice creams for $ 4 and books for $ 5, how many $ you spent?
A. 7

B. 11

C. 9

D. 10

Question 2.

If you bought 6 pizzas on Monday, 3 pizzas on Wednesday and 8 pizzas on FridaySaturday, how many pizzas you have.
A. 17

B. 15

C. 18

D. 19

Question 3.

If you bought books and chocolates for $ 9. Later you returned chocolates worth $ 4, how many $ you spent?
A. 5

B. 7

C. 3

D. 6

Question 4.

$1 \times 1 =$ _____
A. 1

B. 0

C. 3

D. 2

Question 5.

2×4 _____ $2 + 2$
A. can't say

B. is equal to

C. is more than

D. is less than

Question 6.

what is the value if 5 is divided by 5?
A. 2

B. -1

C. 0

Question 11.

Solve $7 - 4 + 9 * 15/3 * 12 - 9 + 8/8$
A. 533

B. 535

C. 532

D. 536

Question 12.

$12 - 9/1 + 1$ _____ $18/9 * 7 - 4 + 1$
A. is equal to

B. can't say

C. is less than

D. is more than

Question 13.

What is the sum of 80 and 40?
A. 80

B. 110

C. 120

D. 140

Question 17.

600 + 700 _____ 400 + 700
A. is equal to

B. is less than

C. is more than

D. can't say

Question 18.

800 - 500 _____ 800 - 200
A. is equal to

B. can't say

C. is less than

D. is more than

Question 19.

5000×3000 _____ 7000×6000
A. is equal to

B. is less than

C. can't say

D. is more than

Question 20.

$\frac{800}{400}$ _____ $\frac{1500}{500}$
A. is equal to

B. is less than

C. is more than

D. can't say

Question 21.

Solve $60 - 40 + 30$
A. 49

B. 51

C. 50

D. 48

Question 22.

$4000/4000 * 4000 + 1000$ _____ $21000/7000 + 7000$
A. is less than

B. is equal to

C. is more than

D. can't say

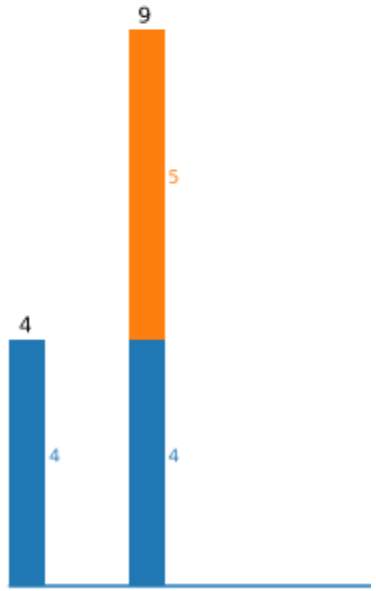
Full solutions for all the questions, which are unlimited in number!

Solution 1

$ you spent
= cost of ice creams + cost of books
= 4 + 5

4
5

Count all of them together:
= 9



Solution 11

$7-4+9*15/3*12-9+8/8$

$=7-4+9*5*12-9+8/8$ **simplify division $15/3=5$**

$=7-4+9*5*12-9+1$ **simplify division $8/8=1$**

$=7-4+45*12-9+1$ **simplify multiplication $9*5=45$**

If the first integer has no sign, it means it is positive.
$=+7-4+45*12-9+1$

Let us collect all positive integers together and negatives separately together:
$=+7+45+1-4-9$

Write sum of all positive integers together and negatives separately together:
$=53-13$

$=535$

Solution 12

Left Hand Side

$=12-9/1+1$

$=12-9+1$ **simplify division $9/1=9$**

If the first integer has no sign, it means it is positive.
$=+12-9+1$

Let us collect all positive integers together and negatives separately together:
$=+12+1-9$

Write sum of all positive integers together and negatives separately together:
$=13-9$

$=4$

Right Hand Side

Solution 22

Left Hand Side

$=4000/4000*4000+1000$

$=1*4000+1000$ **simplify division $4000/4000=1$**

$=4000+1000$ **simplify multiplication $1*4000=4000$**

If the first integer has no sign, it means it is positive.
$=+4000+1000$

Write sum of all positive integers together and negatives separately together:
$=5000$

Right Hand Side

$=21000/7000+7000$

$=3+7000$ **simplify division $21000/7000=3$**

If the first integer has no sign, it means it is positive.
$=+3+7000$

Write sum of all positive integers together and negatives separately together:
$=7003$

Therefore,

LHS = 5000
RHS = 7003

LHS is less than RHS

The progress card

- We initiate ArithmeticManager from question number 1.
- Initially, she would dedicate an entire hour-long session to one or two new questions.
- However, her time taken to solve each previously learned question decreased gradually over time.
- Currently, she can complete approximately 15 questions in a session, having progressed up to question number 22.

Question 22.

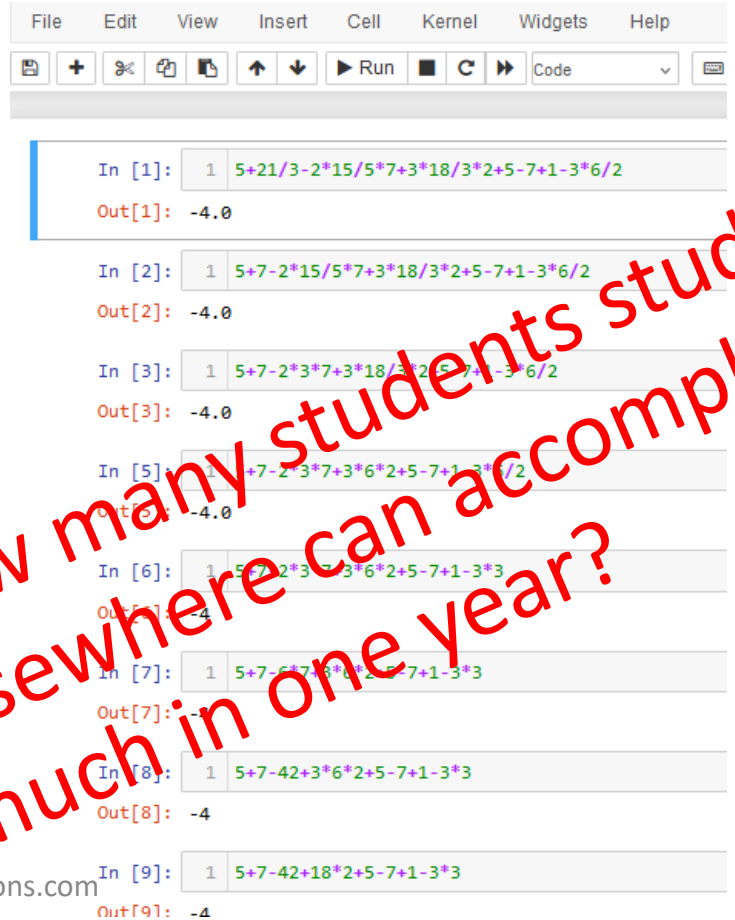
$4000/4000 * 4000 + 1000$ _____ $21000/7000 + 7000$

A. is less than

B. is equal to

C. is more than

D. can't say



How many students studying elsewhere can accomplish so much in one year?

Please note that we ensured:

- No memorization.
- No homework.
- No extra assignments.
- Programming is an essential part of learning; all our students are proficient programmers.
- We don’t have a magic wand. We reduce the study load by creating content with interwoven concepts.

There is more:

- She is a very good dancer, and half the time during the session, you will see her out of her seat and dancing.
- Most of our session time is spent watching videos and having fun.
- Yet, our achievements have been so impressive.
- We have a lot of fun classes where there is no explicit learning, but they are the greatest reasons for our success.

If you feel she is doing great, your kid could be in her place. We don't just teach grade 2; we also instruct higher grades and even college students and professionals in advanced science, math, and AI/ML.

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You can also visit our website at http://www.xcelvations.com/ for more information.