

Prompt: Using everything that we learnt in Maths under [ClassDiary](#) and the class folder 1. Maths , create word problems and homework exercises that exhaustively cover all the topics. Give a list of 50 problems.

The files in the "1. Maths" folder contain notes and homework assignments that cover a range of mathematical concepts, including arithmetic operations, fractions, decimals, and the properties of numbers.

Based on the content in the ClassDiary and the 1. Maths folder, here are 50 word problems and homework exercises that cover the topics discussed in the class:

1. Basic Arithmetic

1. A farmer has 12 apple trees and 8 orange trees. How many trees does the farmer have in total?

It's an addition, The answer is 20.

2. If you have 20 candies and you eat 7, how many candies do you have left?

It's a subtraction, the answer is 13

3. A baker made 3 batches of cookies with 12 cookies in each batch. How many cookies did the baker make?

It's multiplication, the answer is 36.

4. If you have 24 marbles and you want to share them equally with 3 friends, how many marbles does each friend get?

It's division, the answer is 8.

2. Fractions

1. A pizza is cut into 8 slices. If you eat 3 slices, what fraction of the pizza have you eaten?

It's a fraction, the answer is $\frac{3}{8}$.

2. A recipe calls for $\frac{1}{2}$ cup of flour and $\frac{1}{3}$ cup of sugar. How much flour and sugar is needed in total?

It's addition, the answer is $\frac{5}{6}$ cup of ingredients.

3. If you have $\frac{3}{4}$ of a chocolate bar and you eat $\frac{1}{2}$ of it, how much of the chocolate bar is left?

~~It's subtraction, the answer is $\frac{2}{8}$.~~

Amount of chocolate you have, $X = \frac{3}{4}$ bar

Amount you ate, $Y = \frac{1}{2} * X = \frac{1}{2} * \frac{3}{4} \text{ bar} = \frac{3}{8} \text{ bar}$

Amount of chocolate left, $Z = X - Y = \frac{3}{4} \text{ bar} - \frac{3}{8} \text{ bar} = \frac{3}{8} \text{ bar}$

4. A garden is $\frac{2}{3}$ of an acre. If $\frac{1}{4}$ of the garden is used for growing vegetables, how many acres are used for growing vegetables?

It's multiplication, the answer is $\frac{2}{12} \text{ acre} = \frac{1}{6} \text{ acre}$

3. Decimals

1. A shirt costs \$12.50 and a pair of pants costs \$27.95. How much do the shirt and pants cost together?

It's addition, the answer is 40.45

2. If you run 1.5 kilometers on Monday, 2.25 kilometers on Tuesday, and 1.75 kilometers on Wednesday, how many kilometers did you run in total?

It's addition (2 times), the answer is 5.50 kilometers

3. A piece of wood is 3.5 meters long. If you cut off 1.25 meters, how long is the remaining piece of wood?

It's subtraction, the answer is 2.25 meters.

4. A bottle of juice contains 0.75 liters. If you drink 0.2 liters, how much juice is left in the bottle?

It's subtraction, the answer is 0.55 liters.

4. Powers of Ten

1. What is 10 to the power of 3 = 10^{**3} ?

The answer is 1000.

2. What is 10 to the power of -2?

The answer is 0.01.

3. Multiply 123 by 100.

The answer is 12300.

4. Divide 64300 by 1000.

The answer is 64.3

5. Multiply 0.123 by 100.

The answer is 12.3

5. Integers

1. What is the result of $-11 + 23 - 46 + 435 - 637$?

The answer is -236.

2. Solve $11 - (-3)$

The answer is 14.

3. If you have -3 apples, what does that mean?

It means we have to give away 3 apples.

4. Multiply 5×2 and 6×3 . Do these operations satisfy the closure property on integers?

$5 \times 2 = 10$, and $6 \times 3 = 18$. So yes! They satisfy Closure property, because the answers are still integers.

5. Does the closure property hold for division on integers? Explain with examples.

$24/6$ is 4, while $25/6$ is 4.1666... so division may or may not satisfy Closure property on integers.

6. Properties of Numbers

1. Give examples to show which properties are satisfied by addition, subtraction, multiplication, and division on integers

1. Closure property:

2, 3 belong to integers; $2+3$ is also an integer.

2, 3 belong to integers $2-3$ is also an integer.

2, 3 belong to integers 2×3 is also an integer

2. Associative property:

$$(2+3)+4 = 2+(3+4)$$

$$(2 \times 3) \times 4 = 2 \times (3 \times 4)$$

3. Distributive property:

3.1 Right

$$(2+3) \times 4 = (2 \times 4) + (3 \times 4)$$

$$(3-2) \times 4 = (3 \times 4) - (2 \times 4)$$

$$(16+4)/2 = (16/2) + (4/2)$$

$$(16-4)/2 = (16/2) - (4/2)$$

3.2 (left only for *, not /)

$$4*(2+3) = (4*2)+(4*3)$$

$$4*(3-2) = (4*3)-(4*2)$$

4. Commutative property:

$$2+3 = 3+2$$

$$2*3 = 3*2$$

2. Do the same for rational numbers.

1. Closure property:

2.4, 3.7 belong to rational numbers $2.4+3.7$ is also a rational number.

2.4, 3.7 belong to rational numbers $2.4-3.7$ is also an rational number.

2.4, 3.7 belong to rational numbers $2.4*3.7$ is also an rational number.

2.4, 3.7 belong to rational numbers $2.4/3.7$ is also an rational number.

2. Associative property:

$$(2.1+3.1)+4.1 = 2.1+(3.1+4.1) = 2.1 + 7.2 = 9.3$$

So $(2.1 + 3.1) + 4.1 = 2.1+(3.1+4.1)$ and it is associative

$$(2.1*3.1)*4.1 = 2.1*(3.1*4.1)$$

3. Distributive property:

3.1

$$(2.4+3.7)*4.1 = (2.4*4.1)+(3.7*4.1)$$

$$(2.4*3.7)+4.1 = (2.4+4.1)*(3.7+4.1)$$

$$(3.7-2.4)*4.1 = (3.7*4.1)-(2.4*4.1)$$

3.2

$$4.1*(2.4+3.7) = (4.1*2.4)+(4.1*3.7)$$

$$4*(2-3) = (4*2)-(4*3)$$

$$4+(2*3) = (4+2)*(4+3)$$

4. Commutative property:

$$2.1+3.1 = 3.1+2.1$$

$$2.1 \times 3.1 = 3.1 \times 2.1$$

3. Explain why it's important to know about the properties of numbers.

Because natural numbers satisfy Distributive Property, we can use this to do multiplication manually. Like if we want to compute 23×22 , we can do 23×2 and 23×20 and add both of them. For addition, because natural numbers satisfy Associative Property, we can do addition in a different way (same for subtraction). Like $23 + 22 = (3+2) + (20+20)$.

7. Word Problems on Arithmetic Operations

1. A store sold 25 shirts on Monday, 32 shirts on Tuesday, and 18 shirts on Wednesday. How many shirts did the store sell in total?

It's addition, the answer is $25 + 32 + 18 = 75$.

2. A baker has 50 kilograms of flour. If he uses 28 kilograms to bake bread, how much flour does he have left?

It's subtraction, the answer is 22 kilograms.

3. A factory produces 1200 cars per day. How many cars does the factory produce in a week?

It's multiplication, the answer is $1200 \times 7 = 8400$ cars.

4. A school has 480 students and 24 teachers. How many students are there per teacher?

It's division, the answer is $(480 \text{ students}) / (24 \text{ teachers}) = 20$ students per teacher.

8. Word Problems on Fractions

1. A recipe calls for $\frac{2}{3}$ cup of milk and $\frac{1}{4}$ cup of water. How much liquid is needed in total? It's addition $= \frac{2}{3} + \frac{1}{4} = \frac{11}{12}$ cups of liquid.
2. A cake is cut into 12 slices. If 5 slices are eaten, what fraction of the cake is left? $= (12-5)/12 = 7/12$.

3. A farmer has $\frac{3}{5}$ of an acre of land. If he plants corn on $\frac{1}{2}$ of his land, how many acres are planted with corn?

The answer is $\frac{3}{5} \text{ acres} \times \frac{1}{2} = \frac{3}{10} \text{ acres}$

4. A family eats $\frac{3}{4}$ of a pizza. If the pizza had 8 slices, how many slices did they eat?

The answer is $\frac{3}{4} \times 8 \text{ slices} = \frac{24}{4} \text{ slices} = 6 \text{ slices}$

9. Word Problems on Decimals

1. A book costs \$8.99 and a magazine (a type of book) costs \$3.50. How much do the book and magazine cost together?

It's $8.99 + 3.50 = 12.49$.

2. A runner runs 3.2 kilometers on Monday, 4.5 kilometers on Tuesday, and 2.8 kilometers on Wednesday. How many kilometers did the runner run in total?

It's addition $3.2 + 4.5 + 2.8 = 10.5$ kilometers

3. A rope is 10.75 meters long. If you cut off 2.5 meters, how long is the remaining piece of rope?

It's subtraction, the answer is 8.25 meters.

4. A container has 5.25 liters of water. If you pour out 1.75 liters, how much water is left in the container?

It's subtraction, the answer is 4.50

10. Timed Practice

1. Solve $25 + 38$ within 10 seconds.

The answer is 63.

2. Solve $56 - 29$ within 10 seconds.

The answer is 27.

3. Solve 12×7 within 10 seconds

The answer is 84.

4. Solve $81 \div 9$ within 10 seconds.

The answer is 9.

11. BODMAS/PEMDAS

1. Evaluate the expression $15 - 6 \div 2 + 3 \times 4$.

The answer is 24

2. Evaluate the expression $(8 + 2) \times 5 - 4^2$.

The answer is 34.

3. Evaluate the expression $\sqrt{(25)} + 3 \times (10 - 5)$.

- a. $\sqrt{(25)} = 5$ (if $x^2 = x \cdot x = y$, then $\sqrt{y} = x$)
- b. $5 + 2 \cdot (10 - 5) = 15$

12. Verifications

1. Verify the result of $23 + 47 = 70$ using subtraction.

The answer is true ($70 - 23 = 47$)

2. Verify the result of $63 - 28 = 35$ using addition.

The answer is true ($35 + 28 = 63$)

3. Verify the result of $12 \times 5 = 60$ using division.

The answer is true ($60 / 5 = 12$)

4. Verify the result of $72 \div 8 = 9$ using multiplication.

The answer is true ($8 \cdot 9 = 72$)

13. Coding

1. Write a Python program to calculate the sum, difference, product, and quotient of two numbers.
2. Write a Python program to verify the results of addition, subtraction, multiplication, and division using the equality operator (`==`).

Prompt (after putting the above response into a google doc file): Solve all the maths problems in this file. Use similar numbering/sequencing in the answers along with headings of topics as in the original file.

1. Basic Arithmetic

1. $12 + 8 = 20$ trees
2. $20 - 7 = 13$ candies
3. $3 \times 12 = 36$ cookies
4. $24 / 3 = 8$ marbles

2. Fractions

1. $3/8$
2. $1/2 + 1/3 = 5/6$ cup
3. ~~$3/4 - 1/2 = 1/4$~~
4. $2/3 \times 1/4 = 1/6$ acre

3. Decimals

1. $\$12.50 + \$27.95 = \$40.45$
2. $1.5 + 2.25 + 1.75 = 5.5$ kilometers
3. $3.5 - 1.25 = 2.25$ meters
4. $0.75 - 0.2 = 0.55$ liters

4. Powers of Ten

1. $10^3 = 1000$
2. $10^{-2} = 0.01$
3. $123 \times 100 = 12300$
4. $64300 / 1000 = 64.3$
5. $0.123 \times 100 = 12.3$

5. Integers

1. $-11 + 23 - 46 + 435 - 637 = -236$
2. $11 - (-3) = 14$
3. You owe (వేరే వాళ్ళ నుంచి తీసుకుని మళ్ళీ తిరిగి ఇవ్వాలి) someone 3 apples
4. $5 \times 2 = 10$, $6 \times 3 = 18$, yes, because the answers are still integers
5. No, because you can get fractions as answers (ex: $5 / 2 = 2.5$)

7. Word Problems on Arithmetic Operations

1. $25 + 32 + 18 = 75$ shirts
2. $50 - 28 = 22$ kilograms
3. $1200 \times 7 = 8400$ cars
4. $480 / 24 = 20$ students per teacher

8. Word Problems on Fractions

1. $2/3 + 1/4 = 11/12$ cup
2. $12 - 5 = 7$, $7/12$
3. $3/5 \times 1/2 = 3/10$ acre
4. $3/4 \times 8 = 6$ slices

9. Word Problems on Decimals

1. $\$8.99 + \$3.50 = \$12.49$
2. $3.2 + 4.5 + 2.8 = 10.5$ kilometers
3. $10.75 - 2.5 = 8.25$ meters
4. $5.25 - 1.75 = 3.5$ liters

10. Timed Practice

1. $25 + 38 = 63$
2. $56 - 29 = 27$
3. $12 \times 7 = 84$
4. $81 \div 9 = 9$

11. BODMAS/PEMDAS

1. $15 - 6 \div 2 + 3 \times 4 = 15 - 3 + 12 = 24$
2. $(8 + 2) \times 5 - 4^2 = 10 \times 5 - 16 = 50 - 16 = 34$
3. $\sqrt{(25)} + 3 \times (10 - 5) = 5 + 3 \times 5 = 5 + 15 = 20$

12. Verifications

1. $70 - 47 = 23$
2. $35 + 28 = 63$
3. $60 / 5 = 12$
4. $9 \times 8 = 72$

13. Coding

1.

Python

```
def calculate(a, b):

    """Calculates sum, difference, product, and quotient of two numbers.

    Args:

        a: The first number.

        b: The second number.

    Returns:

        A tuple containing the sum, difference, product, and quotient.

    """

    sum = a + b

    difference = a - b

    product = a * b

    quotient = a / b if b != 0 else "Undefined" # Undefined means cannot
tell the answer

    return sum, difference, product, quotient

# Example usage
```

```
num1 = 10

num2 = 5

result = calculate(num1, num2)

print("Sum:", result)

print("Difference:", result)

print("Product:", result)

print("Quotient:", result)
```

2.

Python

```
def verify_results(a, b):

    """Verifies the results of basic arithmetic operations.

    Args:

        a: The first number.

        b: The second number.

    """

    sum = a + b

    difference = a - b

    product = a * b

    quotient = a / b if b != 0 else "Undefined"

    print("Addition Verification:", a + b == sum)

    print("Subtraction Verification:", a - b == difference)

    print("Multiplication Verification:", a * b == product)

    if b != 0:

        print("Division Verification:", a / b == quotient)
```

```

else:

    print("Division Verification: Cannot divide by zero")

# Example usage

num1 = 7

num2 = 3

verify_results(num1, num2)

```

Creating a game to solve these problems:

1. "Using everything that we learnt in Maths under [ClassDiary](#) and the class the folder [1. Maths](#) , create word problems and homework exercises that exhaustively cover all the topics. Give a list of 50 problems."
2. "Solve all the maths problems in this file. Use similar numbering/sequencing in the answers along with headings of topics as in the original file."
3. Write a python program for a 2D running game where the user can move using arrow keys on the keyboard. Create some obstructions to jump over. In addition, create different levels of the game, where each level can be crosses only if one of the maths problems similar to those from this file (use different numbers each time) is solved by the player.
4. Some blocks are moving too fast. And nothing happens if I press arrow keys. Can you instead show a little man like in Mario, who is jumping over obstacles. And then add maths questions for him to solve within a reasonable time limit.
5. "The obstacles are moving too fast. Mario still is not able to move across the 2D grid."
6. "Give the whole code"
7. "Mario now can move left and right on the screen. But not upwards. And the obstacles do not do anything when they hit Mario. Also make the obstacle motion slower. And the maths questions should come in the game window itself and not in python prompt/console."
8. "Give me whole code"
9. "I do not see any questions pop up anywhere. Also the obstacles are still moving too fast. Mario shouldn't hit the obstacles. Don't move the obstacles. The game window should only move when mario moves, not otherwise."
10. "Give me the whole code."
11. "Okay this is good. Now can you move the background very slowly so mario can go over new obstacles over time. And keep adding points to Mario (show total points at the top right corner) when he jumps over obstacle, crosses a level etc."
12. "Give me whole code"
13. "FileNotFoundError: No file 'background.png' found in working directory 'G:\My Drive\VirataHomeSchool\2. ClassMaterial\2. MathsProgrammingTechnology\2.

Programming\0. PythonBasicsSchoolProject'. When I said move the background, I mean the course that Mario is going through. Don't need a separate background file."

14. "Add more obstacles and keep changing them randomly. Move the score to top middle of the game window."
15. "Give me whole code"
16. "TypeError: Random.choice() missing 1 required positional argument: 'seq'"
17. "Give me whole code"
18. "obstacle_y = random.choice() # Choose from these y-coordinates ^^^^^^^^^^^^^^^^^
TypeError: Random.choice() missing 1 required positional argument: 'seq'"
19. "Give me whole code"
20. "You still haven't passed any parameter to random.choice() - may be that's why?"
21. "Give me whole code"
22. "For maths problems, show the remaining time to answer the question also in the game window as a countdown. Make the obstacle movement a little slower."
23. "Compile the list of all the prompts that I asked you above to get this code and fix errors. So I can do the same thing next time if I need."
24. "Write all the prompts in the list exactly as I typed. Do not summarize."
25. "# ... (collision detection and math problem logic remain the same) # ... (math question display remains the same) Fill these also. Give me the entire code so I can directly run it."