

Math Tutor – Mock-up Summary

Question 1

Match Binary to Decimal:

Match these binary numbers with their decimal equivalents.

Binary Decimal

10 (A) ?

1011 (B) ?

For each binary number, users will click on the letter (A, B) and choose one of the following options:

1. What is the decimal equivalent of 10?

(A) 2

(B) 3

(C) 5

(D) 7

Correct Answer: (A) 2

2. What is the decimal equivalent of 1011?

(A) 5

(B) 10

(C) 11

(D) 7

Correct Answer: (C) 11

Hint: Start from the right, add the values for each 1. Scaffolding:

10: $2^1 = 2$.

1011: $8 + 2 + 1 = 11$.

1100: $8 + 4 = 12$.

Question 2

Mini Sudoku Puzzle (3x3 grid)

Rules : Each row, column, and block must contain the numbers 1, 2, and 3 with no repetition.

Puzzle Grid:

1	__	3
__	3	__
3	__	2

Solution:

1	2	3
2	3	1
3	1	2

Hint: Each row and column needs 1, 2, and 3. Fill in the blanks based on what's missing.

Scaffolding:

Row 1: Look at the numbers already filled in. What number is missing?

Row 2: Consider the numbers in this row and column.

Row 3: Think about the available numbers and the pattern.

Question 3

Type: Multiple Choice

Question: Factor $x^2 + 5x + 6$

- (A) $(x+2)(x+3)$
- (B) $(x+1)(x+6)$
- (C) $(x-2)(x-3)$
- (D) $(x+3)(x-2)$

Answer: $(x+2)(x+3)$

Hint: Find two numbers that multiply to 6 and add to 5

Skill: Quadratic factorization

Question 4

Rule: A number is divisible by 3 if the sum of its digits is divisible by 3.

Which 7-digit number is divisible by 3?

- A. 1234560
- B. 7654321
- C. 1111111
- D. 1234567

Answer: A

Hint:

Digits of 1234560 $\rightarrow 1+2+3+4+5+6+0 = 21$, and $21 \div 3 = 7 \rightarrow$ Divisible.

Scaffolding:

Step 1: Check the sum of digits for each number:

1234560: $1 + 2 + 3 + 4 + 5 + 6 + 0 = 21$

7654321: $7 + 6 + 5 + 4 + 3 + 2 + 1 = 28$

1111111: $1 + 1 + 1 + 1 + 1 + 1 + 1 = 7$

1234567: $1 + 2 + 3 + 4 + 5 + 6 + 7 = 28$

Step 2: Check if the sum is divisible by 3:

$21 \div 3 = 7 \rightarrow$ Divisible by 3.

Question 5

What is the next letter in the sequence: B, D, G, K, P, ?

- A) S
- B) T
- C) V
- D) R

Answer: C

Hint:

Each letter's position in the alphabet increases by 2, 3, 4, 5, and so on (B=2, D=4, G=7, K=11, P=16).

Scaffolding:

Step 1: Position of each letter: B = 2, D = 4, G = 7, K = 11, P = 16.

Step 2: Notice the differences: +2, +3, +4, +5. The next difference should be +6.

Step 3: Add 6 to the position of P (16): $16 + 6 = 22$, which corresponds to V.

Question 6

What is the next letter in the sequence: A, D, ?, P, Y?

- A) G
- B) I
- C) F
- D) H

Hint: Each letter's position in the alphabet corresponds to the square of consecutive integers (1^2 , 2^2 , 3^2 , and so on). For example, A = 1^2 , D = 2^2 , P = 4^2 , and Y = 5^2 .

Scaffolding:

Step 1: Position of each letter:

$$A = 1 \rightarrow 1^2 = 1$$

$$D = 4 \rightarrow 2^2 = 4$$

$$? = 3^2 = 9 \rightarrow \text{The 9th letter of the alphabet is I.}$$

$$P = 16 \rightarrow 4^2 = 16$$

$$Y = 25 \rightarrow 5^2 = 25$$

Step 2: Using the square pattern, the letter corresponding to $3^2 = 9$ is I

Question 7

What is the sum of the first 100 natural numbers?

- A) 5050
- B) 5000
- C) 5055
- D) 5100

Hint: To find the sum of the first n natural numbers, use the formula:

$$\text{Sum} = (n + 1) \times n / 2$$

Scaffolding:

Step 1: Use the formula for the sum of the first n natural numbers:

$$\text{Sum} = (n + 1) \times n / 2$$

Here, $n = 100$.

Step 2: Apply the formula:

$$\text{Sum} = (100 + 1) \times 100 / 2$$

$$\text{Sum} = 101 \times 100 / 2$$

$$\text{Sum} = 10100 / 2$$

$$\text{Sum} = 5050.$$

Answer: A) 5050

Question 8

Digit Riddle

✖ I am a two-digit number.

My tens digit is twice my units digit.

The sum of my digits is 12.

👉 What number am I? [____]

On hover options:

- A) 93
- B) 84
- C) 63
- D) 48

Answer: 63

Hint: Try digit pairs where tens = $2 \times$ units.

Scaffolding:

$x + y = 12$, and $x = 2y \rightarrow$ Try: $2y + y = 12 \rightarrow y = 4 \rightarrow x = 8$

But 84: $8 \neq 2 \times 4$. Try again $\rightarrow y = 3 \rightarrow x = 6 \rightarrow 63$

Question 9

Which of the following years is a leap year?

- A) 1900
- B) 2000
- C) 2100
- D) 2200

Answer: B) 2000

Hint: A leap year is divisible by 4, but if it's a century year (like 1900), it must also be divisible by 400.

Scaffolding:

step 1: Is the year divisible by 4?

Yes \rightarrow Continue

No \rightarrow Not a leap year

Step 2: Is it divisible by 100?

Yes \rightarrow Must be divisible by 400 too

No \rightarrow It's a leap year

Step 3: Is the year divisible by 4?

$2000 \div 400 = 5 \rightarrow$ Valid \rightarrow Leap year

Question 10

Three numbers add up to 60. The second number is twice the first, and the third number is 5 more than the second. What is the smallest of the three numbers?

- A) 11
- B) 12
- C) 13
- D) 15

Hint: Use algebra. Let the first number be x . The second number is $2x + 5$. Their sum is 60.

Scaffolding:

1. Let the three numbers be:

first: x
second: $2x$
third: $2x+5$

2. Equation: $x + 2x + (2x+5) = 60$

3. $x = 11$

Put the value of x in first, second and third

first: 11
second: 22
third: 27
smallest of the three number is 11.

Answer: 11