

## NATURAL PATTERN MATHEMATICS

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### PATTERN-BASED MULTIPLICATION METHOD

Understanding numbers through pattern recognition and system building.

Formula:  $(n+1) \times a = n \times a + a$

Where:

- $n$  = current multiplier
- $a$  = base number
- Previous result + base = new result

#### Method 1: Additive Pattern Building

Example using 3:

$$3 \times 0 = 0$$

$$3 \times 1 = 3 + 0 = 3$$

$$3 \times 2 = 3 + 3 = 6$$

$$3 \times 3 = 6 + 3 = 9$$

Pattern Itself:

- Natural rhythm develops with practice
- Brain starts recognizing jump patterns
- By  $3 \times 4$ , you'll feel the "12" coming
- By  $3 \times 20$ , you'll feel the "60" coming
- Pattern becomes intuitive verification

Visual Pattern:

- Start with zero
- Add base number each time
- Build on previous result
- Verify pattern progression

Draw this as:

- Empty space (0)

••• (3)

••• ••• (6)

••• ••• ••• (9)

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## RECURSIVE FACTORIZATION METHOD

Breaking down numbers into natural pattern relationships.

Formula:  $N = x \times 2^n$

Where:

- N = target number
- x = odd number or non-2 factor
- n = power of 2 in factorization

Example:

$40 \rightarrow 20 \times 2 \rightarrow 10 \times 2 \times 2 \rightarrow 5 \times 2^3$

Therefore:  $40 = 5 \times 2^3$

Other Examples:

$12 \rightarrow 6 \times 2 \rightarrow 3 \times 2 \times 2$

$16 \rightarrow 8 \times 2 \rightarrow 4 \times 2 \times 2$

Pattern Itself:

- Numbers naturally reveal their relationships
- Powers of 2 become instantly recognizable
- Brain starts "seeing" factor trees
- Makes larger numbers less intimidating

Pattern Recognition:

- Start with target number
- Find natural divisions
- Follow pattern until complete
- Verify relationships

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## DIVISION THROUGH PATTERN RECOGNITION

Using number relationships for natural division.

Formula:  $N \div d = q + (r \div d)$

Where:

- N = dividend (number being divided)
- d = divisor
- q = largest multiple quotient
- r = remainder

Example:

$$50 \div 7$$

└─ Find q:  $49 = 7 \times 7$

└─ Find r:  $50 - 49 = 1$

└─ Result:  $7 + (1 \div 7)$

Example (Even Numbers):

$$48 \div 4$$

Pattern Discovery:  $48 \rightarrow 4 \times 12$

Therefore:  $48 \div 4 = 12$

Example (Odd/Remainder):

$$50 \div 7$$

Pattern Method:

1. Find closest pattern:  $49 \rightarrow 7 \times 7$
2. Remainder:  $50 - 49 = 1$
3. Therefore:  $50 \div 7 = 7$  remainder 1  
OR 7.142... ( $1 \div 7$  added)

Pattern Itself:

- Division becomes reverse pattern matching
- Find nearest comfortable multiple
- Subtract remainder for precision
- Brain starts "feeling" number relationships
- Makes estimation more natural
- Reduces division anxiety

Visual Aid:

$$50 \div 7$$

└─ 49 ( $7 \times 7$ ) + 1 remainder

└─ 7 whole numbers

└─  $1 \div 7$  for decimal

└─ 7.142...