

Base-13 Technical Appendix: Tables and Data

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1 Complete Base-13 Addition Table

Table 1: Complete Base-13 Addition Table

| + | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|---|---|----|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | 10 |
| 2 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | 10 | 11 |
| 3 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | 10 | 11 | 12 |
| 4 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | 10 | 11 | 12 | 13 |
| 5 | 5 | 6 | 7 | 8 | 9 | A | B | C | 10 | 11 | 12 | 13 | 14 |
| 6 | 6 | 7 | 8 | 9 | A | B | C | 10 | 11 | 12 | 13 | 14 | 15 |
| 7 | 7 | 8 | 9 | A | B | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 8 | 8 | 9 | A | B | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 9 | 9 | A | B | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| A | A | B | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| B | B | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 1A |
| C | C | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 1A | 1B |

2 Complete Base-13 Multiplication Table

3 Mathematical Constants in Base-13

4 Beta Sequence Analysis

5 Prime Numbers in Base-13

6 Conversion Verification Results

Table 2: Base-13 Multiplication Table

| \times | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|----------|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
| 2 | 0 | 2 | 4 | 6 | 8 | A | C | 11 | 13 | 15 | 17 | 19 | 1B |
| 3 | 0 | 3 | 6 | 9 | C | 12 | 15 | 18 | 1B | 1E | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | C | 13 | 17 | 1B | 1F | 23 | 27 | 2B | 2F | 33 |
| 5 | 0 | 5 | A | 12 | 17 | 1C | 21 | 26 | 2B | 30 | 35 | 3A | 3F |
| 6 | 0 | 6 | C | 15 | 1B | 21 | 27 | 2D | 33 | 39 | 3F | 45 | 4B |
| 7 | 0 | 7 | 11 | 18 | 1F | 26 | 2D | 34 | 3B | 42 | 49 | 50 | 57 |
| 8 | 0 | 8 | 13 | 1B | 23 | 2B | 33 | 3B | 43 | 4B | 53 | 5B | 63 |
| 9 | 0 | 9 | 15 | 1E | 27 | 30 | 39 | 42 | 4B | 54 | 5D | 66 | 6F |
| A | 0 | A | 17 | 21 | 2B | 35 | 3F | 49 | 53 | 5D | 67 | 71 | 7B |
| B | 0 | B | 19 | 24 | 2F | 3A | 45 | 50 | 5B | 66 | 71 | 7C | 87 |
| C | 0 | C | 1B | 27 | 33 | 3F | 4B | 57 | 63 | 6F | 7B | 87 | 93 |

Table 3: Mathematical Constants - First 30 Base-13 Digits

| Constant | Decimal Value | Base-13 Expansion (30 digits) |
|---------------|-----------------|------------------------------------|
| π | 3.1415926535... | 3.1AC1049052A2C7100527315BCA785... |
| e | 2.7182818284... | 2.9450B026A6BA186B124C585775A93... |
| $\sqrt{2}$ | 1.4142135623... | 1.55004799B620603C880B87623A918... |
| ϕ | 1.6180339887... | 1.7C4B5A792C705A19334B862545287... |
| α^{-1} | 137.035999... | A7.0611223B2C0C9834B857C91A465... |
| C^* | 0.894751918... | 0.B8C5A9316B04528731945CA7685B9... |

Table 4: Beta Sequence Properties

| Property | Value | Base-13 Equivalent |
|-------------------|-----------------------------------|--------------------------------|
| Original sequence | [13,4,5,2,11,12,7,9,8,6,1,3,0,10] | [10,4,5,2,B,C,7,9,8,6,1,3,0,A] |
| Sum | 91 | 70 |
| Sum modulo 13 | 0 | 0 |
| Length | 14 | 11 |
| Mean | 6.5 | 6.5 |

Table 5: First 50 Prime Numbers in Base-13

| Decimal | Base-13 | Decimal | Base-13 | Decimal | Base-13 |
|---------|---------|---------|---------|---------|---------|
| 2 | 2 | 17 | 14 | 43 | 34 |
| 3 | 3 | 19 | 16 | 47 | 38 |
| 5 | 5 | 23 | 1A | 53 | 41 |
| 7 | 7 | 29 | 20 | 59 | 46 |
| 11 | B | 31 | 25 | 61 | 4A |
| 13 | 10 | 37 | 2B | 67 | 52 |

Table 6: Conversion Algorithm Test Results

| Test Category | Number Tested | Success Rate | Accuracy |
|-------------------------------|---------------|--------------|----------|
| Integer conversions (0-1000) | 25 | 100% | Perfect |
| Fractional conversions | 20 | 100% | Perfect |
| Back-conversions | 25 | 100% | Perfect |
| Large numbers (up to 10^6) | 15 | 100% | Perfect |
| Total | 85 | 100% | Perfect |