

Math 3131 Prof. Pennance – Summary of Lecture 5 - Place Value ¹

1. Place value system
 - (a) Comparison with ancient egyptian
 - (b) Chip models
 - (c) The sequence of denominations 1, 10, 100, 1000, etc
 - (d)
 - i. $10 = 10$ “bundles” of size 1.
 - ii. $100 = 10$ bundles of size 10
 - iii. $1000 = 10$ bundles of size 100
 - iv. etc
 - v. $10 \times 1 \underbrace{00 \dots 0}_{n-1 \text{ zeros}} = 1 \underbrace{00 \dots 0}_n$
 - (e) Bundling - counting the number of bundles in each denomination.
 2. Developing place value skills in children
 - (a) Counting by tens “10, 20, 30, ...”
 - (b) Switching decades
successor(39) \neq “thirty ten”
-must rebundle
 - (c) What number is 20 more than 168? Add 2 bundles of 10. Can use skip counting by 10.
 - (d) Writing in expanded form 3784:
3 thousands +7 hundreds +8 tens
+4 ones
 3.
 - (a) Addition in chip model.
 - (b) Rebundling.
 - (c) Addition in expanded form.
 - (d) The use of cards
 4. Multiplying by 10 and 100 by addition of 0’s. Not obvious.
 5. Addition
 - (a) Definition of addition
 $n + m = |A \cup B|$ where A and B are disjoint sets with $|A| = n$ and $|B| = m$
 - (b) Commutative property:
 $n + m = m + n$
 - (c) $2 + 19 = 19 + 2$. By counting on we obtain 21.
 - (d) Associative property:
 $(n + m) + p = n + (m + p)$
 - (e) Show $(3 + 7) + 5 = (3 + 5) + 7$
6. An addition table
 - (a) Sequence of doubles
 $1 + 1, 2 + 2, 3 + 3, \dots, 10 + 10$
Nmemonics:
 $5 + 5 = 10$ “Fingers fact” etc.
Applications: $6 + 7 = (6 + 6) + 1$
 - (b) Sequence of Combinations of 10
 $10+0, 9 + 1, 8+2, \dots, 0 + 10$
Composing a ten
 $74 + 6 = (70 + 6) + 4$
 $= 70 + (6+4) = 70 + 10 = 80$
 7. Compensation
 - (a) $9 + 6 = 10 + 5$
 - (b) $58 + 22 = 60 + 20$
 - (c) $342 + 96 = 338 + 100$
 - (d) $893 + 328 = 900 + 321$
 - (e) $45 + 47 = 46 + 46 = 40 + 40 + 6 + 6$
etc
 8. Decomposing a ten
 $43 - 15 = (3 \text{ ten's} + 13) - (1 \text{ ten} + 5) = 2 \text{ tens} + 8 = 28$
 9. Meaning of equality sign.
 - (a) Wrong: $3 + 5 + 9 + 2 = 3 + 5 = 8 + 9 = 17 + 2 = 19$

¹Reference: Chapter 1. Elementary Mathematics for Teacher by Thomas Parker and Scott Baldrige