Chapter 3 Test: Topics to review.

To prepare for the Chapter 3 test, make sure you know how to do the following.

1. Numeration

Base 10

Name base-10 pieces and explain their value [for example: a unit is $10^0 = 1$, a flat is $10^2 = 100$, a long-flat is … etc.].

What number follows the number 19 (in base 10)? Explain using manipulatives (cubes) and the place-value table.

Represent a number with appropriate base-10 pieces and use the pieces to explain the expanded form of the number. *Example: Draw Base-10 pieces to represent the numbers 356, 1032, 3321, … etc. Write these numbers in expanded form. (The expanded form of 356 is $3 \cdot 10^2 + 5 \cdot 10^1 + 6 \cdot 10^0$ or $3 \cdot 100 + 5 \cdot 10 + 6 \cdot 1$)*

Round off a number. *Example: Round off the number 749 to the nearest ten.*

Other number base systems (pages 61-64 in the book)

Given a base-10 number (number of cubes), write down a corresponding number in a different base systems and explain the conversion using manipulatives (regrouping and exchanging cubes, longs, flats…). *Example: How is the number 17 written in base-5 system? How about number 13 in base-2 system?* Etc. [Answers: $17 = 32_{five}$, $13 = 1101_{two}$]

Write a base-n number in its expanded form. How can the expanded form be used to find the value in base-10? *Examples: What is 33_{five} in base-10? What is 1010_{two} in base-10?* [Answers: $33_{five} = 18$, $1010_{two} = 10$;]

Count in other base systems. *Example: List 5 numbers preceding and 5 numbers succeeding the numbers: 555_{six} , 10000_{two}, 1001_{four} .*

What's wrong with the following numerals? 352_{five} , 702_{two} etc.…

2. Addition and Subtraction

In Base-10

Find the following sums and explain your solution using the model given in the parentheses.
7 + 6 (number-line model – "arrows"), 9 + 4 (sets), 23 – 5 (number-line – "hopping").

Basic addition facts: *Use basic addition facts to find 9 + 8* [Answer: for example 9 + (1 + 7)= (9 + 1) + 7 = 10 + 7 = 17. Used basic fact strategies: adding to 10 (9+1), adding 10 (10 + 7), associative property].

Demonstrate the three methods of subtraction – Take away, Missing Addend and Comparison (see also page 77-78)

Properties of addition and subtraction:
Is the table of basic addition facts symmetrical about a diagonal? Why? Why is the number 0 special with respect to addition? Is subtraction an associative operation? Explain. Etc…

Use "Scratch algorithm" to add the numbers: 234 + 45 + 56 + 73 + 21
Use the "lattice" method to calculate 2345 + 5432.

Solve 234 + 34 using the "standard" and "expanded" algorithm. Compare their length and complexity.

Solve 4321 - 543 using the "standard", "Austrian", "equal addends", and "nines-complement" algorithm.

Other Bases (pages 71-78):

Fill in the table of basic addition facts in base 6. Do not use base-10 to fill it in; use manipulatives and the place-value table instead (for example use cubes to explain why $4_{six} + 4_{six} = 12_{six}$). Use the table to find $453_{six} + 23_{six}$. Solve the same problem using manipulatives and the place-value table. [Answer: 520_{six}]

Subtract each of the following and explain your solution using the model given in the parentheses.
$32_{six} – 5_{six}$ = (take away) , $24_{five} – 13_{five}$ = (missing addend) , $1325_{seven} – 211_{seven}$ (comparison) .

3. Multiplication and Division (pages 81-94)

Find the following products and explain your solution using the model/manipulatives given in the parentheses. $7 \cdot 3$ (number-line model), $19 \cdot 4$ (base 10 pieces), $32 \cdot 43$ (base-10 pieces or "multiplication grid" and the place-value table).

Formulate a typical word problem, which can be solved using a tree diagram (Cartesian-product model; make up your own, don't use the "burger" problem from the class).

Explain the distributive property of multiplication over addition.

- Solve $234 \cdot 34$ using the "standard" and "expanded" algorithm. Compare their length and complexity.
- Use the "Lattice method" and solve $45,602 \cdot 12$.
- Explain how we can use fingers to find $4 \cdot 9$. Use a different "finger" method to find $6 \cdot 8$

Solve division problems using sharing, measurement and area method. (page 88, 91)

Formulate the definition of division and use it to solve the following problems:
0÷7, 7÷0 and 0÷0 . Explain your answers.

Apply the standard algorithm of division ("long division") to solve 4352 ÷ 26 .

Use the "bottles in boxes" story to explain how to solve 144 ÷ 6 using long division.

Use area model (Multiplication grid or base-10 pieces) to divide the above numbers (see also page 94).