

Each exam's Topics/Objectives List tells what I'll expect of you on that exam, and gives an outline for creating your own, detailed study guide. Compare the list to your notes, in-class materials, reading, online links, Bonus Study Prompts, Weekly Assessments, Required Practice, and extra practice problems - you might want to recopy key definitions and explanations, rewrite thorough examples of tasks and solutions, jot down warnings of what not to do, etc. Strive to master concepts, explanations, and computational techniques in general; memorizing specific examples is seldom successful.

**Number Sentences, Fact Families** - Using whole numbers, fractions, and now also **integers and decimals**

1. Know, closely spell names of all parts of addition, subtraction, multiplication, and division sentences.
2. Create a number sentence having given numbers or behaviors in certain roles. If not possible, explain.
  - (a) Pay attention to which types of numbers the question allows. That affects possible/impossible.
  - (b) On Day One, we used only whole numbers and/or fractions, but we've since covered integers and decimals, so they are fair game! Read problems carefully to know which numbers are allowed.
3. Create a complete Fact Family that goes with a given number sentence or list of numbers.
  - (a) This can use fractions, integers, or decimals, so practice carefully - especially integers.

**Arithmetic Properties:** Memorize names and behaviors from Summary #2.

1. Given the name of a property, fully explain what it means in 3rd-5th grade style words.
2. Given a 3rd-5th grade style description of a property, tell the name of the property described.
3. Given a number sentence, identify (closely spell) the COMPLETE name of the property it illustrates.
4. Complete a number sentence to illustrate a required property and ONLY that property.

**Word Problem Scenarios:** Memorize names, operations, characteristics from Summaries #1-1.5.

1. Define the term *scenario* as it's used in our class.
2. Given a whole number or decimal word problem, prepare for any or all of these tasks:
  - (a) Write the complete number sentence it requires.
  - (b) Name the operation it requires.
  - (c) Name the scenario it illustrates.
  - (d) Tell whether the problem uses objects or measurements.
3. Create an original word problem (remember to ask a question!) that requires a given computation and scenario. When asked, also use measurements vs. objects.

**Integers:** Know that the set **Z** of integers consists of the whole numbers and their opposites.

1. Understand that a “-” sign in front of an EXPRESSION or VARIABLE does not make it a negative number (as in,  $-x$  could be a positive number if  $x$  is itself negative). Zero is neither positive nor negative.
  - (a) Do NOT rename a variable to include a - that isn't given: for instance, in Problem #5 of WA #3,  $S$  is already negative, so don't refer to it as “ $-S$ ” in your explanations.
2. Understand integers on the number line and that LEFT is always LESS.
3. Explain the confusion of statements like “ $-5$  is a greater negative than  $-2$ .” Rephrase correctly. AVOID this phrase in your own explanations.
4. Understand, use absolute value as distance from zero physically, as the “positive version” of a number.
5. Evaluate absolute value expressions like those from WA, Practice; know that  $|0| = 0$  and is not positive.
6. As in Activity, answer questions about integer arithmetic rules applied to variables on a number line; explain carefully.
7. Place variables on a number line to fit given info about their operations, absolute values, and/or greater/less.
8. Given a specific integer arithmetic computation, write entirely in words how to read it aloud.
9. Work with models: Clown, temperature stories, Number Sentence Patterns, chips (they'll be available). Memorize the rules and interpretations that go with each.

- (a) Explain that we use models to make sense of or lead to recognizing patterns in abstract rules.
- (b) Work with models MUST use the original numbers and operations, no rewriting. (I.e.,  $2 - (-5)$  must be treated as “2 minus negative 5,” and NOT as “2 plus 5.”)
- (c) Explain the appearance, meaning, and effect of zero pairs with chips.
- (d) Verbally explain steps to act out a given add/subtract/multiply/divide task using chips. If you put in zero pairs, tell WHY. State the chip AND numeric answers.
- (e) For chip multiplication or division, recognize/create computations that are impossible to act out, explaining what goes wrong.
- (f) Create Number Sentence Patterns leading to a given computation, applying our guidelines.
- (g) Describe the movements and ending position of the Clown-on-a-Tightrope for a given computation.
- (h) Write the complete, precise integer number sentence acted out by the Clown in a given story.
- (i) Write the full number sentence for a given temperature story. Answer the actual story in words.
- (j) Write a temperature story that models a given integer arithmetic computation (expression).
  - i. Remember: multiplication temperature stories can only ask comparisons, not actual temperatures. Ask “Was it warmer/colder, and by how much?,” not “What was the temperature?”
- (k) Correctly interpret negative signs when reporting verbal answers to temperature stories.

**Decimal Numbers, Arithmetic:** Define the CONCEPT “place value.” (See notes.)

1. Identify positions in a numeral by written name, numeral/fraction (as in 100s or 1/10s), and exponent.
2. Explain in a sentence the pattern approach for understanding what  $10^0$  and  $10^{-1}$  equal. Do NOT refer to shortcut memory aids like “it tells the number of 0s to write.”
3. Convert: standard notation, word form, expanded form with multiplication/with exponents.
4. Round decimal numbers; remember that the rounding place MUST contain a digit (even if it’s 0).
5. Find one or more numbers that round TO a desired result, including rounding up vs. down.
6. Find some/all decimal numbers satisfying given clues, including rounding or exponent clues.
7. Add, subtract, multiply, divide decimal numbers by hand, showing clear, teacher-like markings.
8. Explain clearly what we do with decimal points in EACH algorithm; also explain WHY when asked.
9. Explain how to use position NAMES (not counting “how many”) to find the smallest place value in a given product.
10. Given a student’s set-up for a decimal word problem, explain whether it is right or wrong, offer corrections.
11. See the earlier section on Scenarios for other tasks to do with decimal word problems.

**You will have the entire class period to take the exam. When you finish, you may hand it in and leave.**

**You will need a basic calculator (not cell phone, no alphabet), but no other aids are permitted.**

Students with documented accommodations should speak with me and process ODS requests ASAP. ODS should proctor your accommodations since our classroom and my schedule are not automatically free.