

Exam 1 Study Guide

Study Materials

The following resources are available for studying:

- In-class SmartBoard notes (posted on d2l)
- *Activities* we did in class
- Read the appropriate sections from the textbook
- Practice Problems from the appropriate sections from the textbook

Outline of Content: Whole Number (WN)

Below is an outline of the content covered and the corresponding textbook sections, activities, and lessons.

	Textbook	Activities
Meaning of the Four Operations		
Additive Relationships	3.1	3C, 3E, 3F
Multiplicative Relationships	4.1, 6.1	4A
Place Value and Computation		
Transitioning to Place Value	1.1, 1.3	1J, 1C, 1D
Multi-Digit Additive Computation	3.2, 3.3	3L, 3P, 3J, 3K 3M, 3N, 3O
Other Number Systems	-	
Multi-Digit Multiplication	4.2, 4.5, 4.6	4X, 4V, 4W, 4D 4Y, 4Z, 4AA, 4BB
Multi-Digit Division	6.3	6H, 6I, 6J 6K, 6N, 6M
Properties of the Four Operations		
Relating the Four Operations	6.1	6C
Properties of Arithmetic	3.2, 4.3, 4.4, 4.5	

Note: Some of the activities we did not do in class, but I asked you to read them. It would be beneficial to make sure you are familiar with the concepts covered in all the listed activities.

Big Ideas

The outline below highlights the big ideas, **BUT** it is not an exhaustive list of everything that might appear on the exam. I may ask new or different questions that require you to use the knowledge below in a new way.

Meaning of the Four Operations

- You should know all 11 additive CGI problem types.
 - Create them all from memory without any extra help
 - Identify problems
 - Identify the role of each quantity in a problem. For example:
 - “I have 3 toys, I get some more, now I have 5. How many did I get?”
 - Identify 3 toys in the beginning as the **start**, “get some more” as the **change** and 5 toys at the end as the **result**.
- You should know the 3 Equal Groups CGI problem types.
 - Create them all from memory without any extra help
 - Identify problems
 - Identify the role of each quantity in a problem. For example:
 - “I have 5 friends. I have 15 toys. How many toys can I give to each friend?”
 - “5 friends” is the **number of groups**, “how many... to each friend” is the **group size**, and “15 toys” is the **product**.
- You should be able to work with Array/Area problems as well, but they will receive less attention than Equal Groups problems.

Place Value

- Write Equal Groups problems that emphasize place value
 - Know to make the **group size** 10 (or a higher place value if you want to emphasize that)
 - Know that **group size unknown** problems do not work
- Give multiple names for the same number using *ones, tens, hundreds, thousands*, etc.
 - Know the “standard” or “normal” name (e.g., 178 as 1 *hundred*, 7 *tens*, and 8 *ones*)
 - Give multiple other names (e.g., 178 as 1 *hundred*, 6 *tens*, and 8 *ones*)
 - Explain how you can move between names (e.g., “trade in / break 1 *ten* for 10 *ones*)
 - Draw corresponding pictures with base-ten blocks

Additive Computation

- Solve multi-digit addition and subtraction problems in multiple ways, including the standard U.S. algorithm.
- Represent your work or a student’s work using:
 - arrow language or multiple equations
 - base-ten blocks
 - number lines
- Provide step by step justification for why a strategy makes sense, including for the standard U.S. algorithm (again may have to represent in the ways described above).

- This may include identifying properties (like the commutative property) used in the strategy.
- Show subtraction on a number line as both:
 - “take away” where the answer is where you land
 - “difference” where the answer is the gap between the two numbers on the number line
- Can identify errors in children’s work and explain why they are mathematically incorrect.

Other Number Systems

- Can name numbers by putting them in groups that are multiples of 20 instead of 10.

Multi-digit Multiplication

- Solve multi-digit multiplication problems in multiple ways, including **partial products** and the **standard U.S. algorithm**.
- Represent your work or a student’s work using:
 - arrow language or multiple equations
 - base-ten blocks
 - array/area representations
- Provide step by step justification for why a strategy makes sense, including for **partial products** and the **standard U.S. algorithm** (again may have to represent in the ways described above).
 - This may include identifying properties used in the strategy.
- Can identify errors in children’s work and explain why they are mathematically incorrect.

Multi-digit Division

- Solve multi-digit division problems in multiple ways, including the **scaffold method** and the **standard U.S. algorithm**.
- Represent your work or a student’s work using:
 - arrow language or multiple equations
 - base-ten blocks
 - array/area representations
- Provide step by step justification for why a strategy makes sense, including for partial products and the standard U.S. algorithm (again may have to represent in the ways described above).
 - Know which problem type (Equal Groups, # of Groups Unknown vs. Group Size Unknown) work better for explaining the **scaffold method** and the **standard U.S. algorithm**.
 - This may include identifying properties used in the strategy.
- Can identify errors in children’s work and explain why they are mathematically incorrect.

Relating the Four Operations

- Can write sets of equations showing the relationships between any two operations.
 - Use the relationship between multiplication and division to explain why dividing by zero does not make sense.

Properties of Arithmetic

- The key properties (sometimes called field properties) of arithmetic are:
 - Associative property of addition
 - Associative property of multiplication
 - Commutative property of addition
 - Commutative property of multiplication
 - Distributive property
 - Identity element of addition (0)
 - Identity element of multiplication (1)
- Name these properties from memory without help
- Identify examples of these properties in strategies and algorithms
- Create representations that demonstrate and/or justify these properties
- Recognize when properties are misused