

Math 221C
Fall 1999

Name _____
Group _____

Test 2

Instructions. Answer the questions below on the paper provided. **Do not do any work on the test paper.** Each sheet should be clearly labeled with your name and the question(s) being answered. Please use only one side of each sheet of paper. When you are finished, put your sheets in order and bring them up to be stapled together. **Please leave a 1 inch margin on both sides and at the top of your page.**

In grading **short answer** questions I will generally be looking for answers that are true, accurate, **concise**, coherent, important, and supported. Be sure to show all of your work on the **mathematical tasks, explaining your reasoning as you go.** If you use a calculator, be sure to record the operation and result.

1. WORD PROBLEMS.

[12]

- Give an example of a word problem that Van de Walle would classify as “equal groups, size of groups unknown”.
- Is it more natural to think of the division in problems of the type above using the “repeated subtraction” interpretation or the “fair share” interpretation? Why?
- How would Van de Walle classify the following problem?

In Matt Maddox’s third grades class there are 23 students, 11 of which are boys. How many girls are in his class?

- Write two number sentences for the word problem above, one of which is the “computational form”. Identify which one is the “computational form”.
- Why does Van de Walle want teachers to think about this sort of classification scheme? Should it be taught to students?

2. BASIC FACTS.

[10]

- Which of the following are basic facts (in base ten)? Which are not?
 $5 + 7 = 12$ $3 + 13 = 16$ $15 - 4 = 11$ $13 - 4 = 9$ $4 \times 8 = 32$ $7 \times 3 = 21$
- For **TWO** of the basic facts above, describe a “thinking strategy” for learning the basic fact and give an example of another basic fact that can be done using the same strategy. Explain your strategy as you would explain it to a grade school student learning the basic facts.
- Why are the basic facts important?

- 3. A BASE FIVE MODEL.** Sue is working on her 221 homework. She doesn’t have any base five blocks in her dorm room, so she takes out some pennies, nickels and quarters and decides to use them as a model. [8]

- Explain how Sue’s coins can be used as a **place value model for base five.**
- Is this a proportional or non-proportional model of place value? Why?
- Does this model have any advantages or disadvantages when compared with the base five blocks model?

4. OTHER BASES. [15]

- a) Sally has some base five pieces on her desk: three flats, nine longs and thirteen units. Show (by drawing sketches of the model) how to make the appropriate “exchanges” with the model to get the standard base five representation for the number being modeled.
- b) Convert 75_{ten} to base 6.
- c) Convert 75_{eight} to base 10.
- d) Express 437_{ten} using “place value language.”
- e) Express 4321_{five} using “place value language.”

5. DIVISION AND ZERO. [10]

- a) Does $6 \div 0$ make sense? If so, what is it, and why? If not, why not?
- b) Which interpretation of division did you use in your explanation of part (a)?
- c) Does $0 \div 6$ make sense? If so, what is it and why? If not, why not?
- d) Which interpretation of division did you use in your explanation of part (c)?

- 6. [5]**
- a) Middleton Middle School is going on a field trip. The school has 123 students. If 9 students can fit in a van (plus a driver and a chaperone) how many vans will the school need to rent for the trip?
 - b) Give an example of a problem that involves the division $123 \div 9$ but for which the answer to the problem is different from the one above.

7. SOME SUMS. [10]

- a) Sketch an array model for $6 \times 7 = 42$.
- b) Divide your array model into two parts, each clearly representing $1 + 2 + 3 + 4 + 5 + 6$, and use this to explain how to determine the value of $1 + 2 + 3 + 4 + 5 + 6$ without doing all of the additions.
- c) Generalize this reasoning to give a formula for the sum of the first n numbers, i.e., for $1 + 2 + 3 + \dots + n$. Explain how you know your formula is correct and as an example, use it to determine $1 + 2 + 3 + 4 + \dots + 200$.