Prof. S. Brick **Math for Elem Ed I; Final** **Math 201**
Summer '04 **section 501**

Print your name:

Show all of your work. Explain your reasoning. NO CALCULATORS.

1. Your class has a balance scale to weigh objects. The scale has two pans, one for the objects to be weighed, the other to place pre-measured weights on. The pre-measured weights consist of a single 1-gram weight, a single 2-gram weight, a single 4-gram weight, a single 8-gram weight, and a single 16-gram weight. What are all the possible weights of possible objects that the scale can accurately measure using this collection of weights ? What numeration system does this activity explore ? Explain your reasoning.

2. A survey of 120 students shows that 90 love math, 65 love history, yet 5 do not love either of the two subjects (I know, it's hard to imagine). Draw and use a Venn diagram to determine how many love both math and history. Show and explain all of your steps.

3. If five men working three hours can dig four holes, how long does it take one man to dig one hole ? Explain your steps. (Give your answer in hours and minutes.)

4. Use the charged particle model to explain the computations $3-(-7)$. Show and explain all the steps, using pictures and words.

5. Construct a multiplication table for base five and use it to calculate $243 \div 3$ (both numbers here are in base five).

6. Use an area measurement model, with clearly drawn and labeled pictures, to work through the problem: "A city park field covers $1\frac{1}{2}$ acres. Bags of grass seed cover $\frac{1}{3}$ acres each. How many bags will be needed for the field ?" State the mathematical problem being solved here.

7. Find the prime factorizations for 132 and 126 and use them to find their GCD. Do **not** use the Euclidean algorithm. Show and explain all of your steps.

8. Working in base six, compute the sum of 254 and 1435 using place value cards. Use several figures to show how your calculation progresses. Explain each step.

9. You make a purchase totaling \$14.20. The sales tax is 9%. Explain how to use mental math to find the sales tax. Give a two step method that involves no explicit multiplication, but only moving the decimal place and subtraction. (Use the "5 Up" rule in your calculation for any tenths of cents.) Show and explain all of your steps.

10. Explain how the car number-line model works for the problems $50+(-30)$ and $50-30$. Be explicit about the difference between the problems.

11. Use the mail-time model and words such as "big" and "small" to explain what happens when you multiply the inequality $a < b$ by -1. You may assume that both a and b are positive, but do not assign any numerical values to either of them.

12. Express $0.24\overline{24}$ as a fraction of integers in simplest form. Show and explain all of your steps.

13. Use an area model to compute the sum of $\frac{1}{3}$ and $\frac{1}{2}$. Show and explain all of your steps.

14. Suppose A and B are positive. If 74% of A equals 37% of B, find the ratio of A to $A + B$. Do not assign any numerical values to either A or B.

SCRATCH PAPER below– will not be graded