

MA 201 Exam 1

Name:

You may use a non-graphing calculator, but remember to show ALL your work and explain your answers.

1. (a) (11 points) List the NCTM Principles for School Mathematics. (ECTLAT)

(b) List the NCTM Content Standards for School Mathematics. (5)

(c) List the NCTM Process Standards for School Mathematics. (5)

2. (18 points) Consider the fact $12 \div 3 = 4$. For each of the 3 conceptual models for division, state the model and create a word problem which illustrates $12 \div 3 = 4$ for that model.

(a) Model:

(b) Model:

(c) Model:

3. (a) (8 points) Give the definition of *Equivalence* of two sets A and B.

(b) Give an example of two equivalent sets.

4. (a) (11 points) Convert 54_{ten} to base two.

(b) Solve $123_{five} + 224_{five}$. Your answer should be in base five.

5. (a) (14 points) Sketch the solution to $235 - 142$ twice. The first time using Units, Strips, and Mats. Be sure to clearly show all exchanges. Then, for the second time, calculate the solution using the Instructional Algorithm.

- (b) Explain why we don't we teach the Final Algorithm for subtraction first.

6. (16 points) Consider the following multiplication problem. Is the work done correctly or incorrectly? If it is incorrect, identify the mistakes and discuss the possible reasons for each mistake.

$$\begin{aligned} 211 \cdot 352 &= 211(300 + 50 + 2) = (200 + 10 + 1) \cdot (300 + 50 + 2) \\ &= 200 \cdot 300 + 50 \cdot 10 + 2 \cdot 1 \\ &= 600 + 50 + 2 = 652 \end{aligned}$$

7. (a) (10 points) For two whole numbers, a and b , define a is less than b .

(b) Explain to me how you would teach a first grader that $2 < 5$. (Use sentences, not just pictures.)

8. (12 points) Let $A = \{6, 12, 18, 24, \dots\}$ the set of multiples of 6. Let $B = \{15, 30, 45, 60, \dots\}$ the set of multiples of 15.

(a) Find four more elements of B .

(b) Define $A \cap B$.

(c) Describe $A \cap B$ in set builder notation. (This must be different from your answer to part (b).)

9. (Bonus 5 points) There are 25 people at the Smith family reunion. 8 people ate a hotdog, 15 people ate a hamburger, and 6 people ate a piece of chicken. Exactly 3 people only ate a hotdog and exactly 5 people only ate chicken. If one person ate all three, how many people only ate a hamburger? (Use a Venn Diagram.)