**MATH 246**
Review for Test 2

1. Suppose an alien visits Earth and sees 23 rocks on the ground.
    (a) If this alien has 4 fingers on each hand (and s/he counts like we do), what number will the alien write down?
    (b) Repeat part (a) if the alien has 3 fingers on each hand.

2. Consider the base 5 system.
    (a) How many units are in the number 2302_{five} ? Explain clearly how you obtained your answer.
    (b) Given 88 units, how do you express this number in base 5?

3. Recall the different numeration systems we've studied:

    Mayan (base 20, vertical) with   Babylonian (base 60, horizontal) with
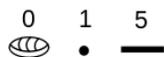
    Write the following numbers in each of the systems:
        (a) 24   (b) 76   (c) 434

4. Identify the problem type for each of the following problems. You might want to start by identifying the action (joining or separating) or situation (part-part-whole or compare) and then decide what is unknown.
    (a) John has 6 blue pens and 4 black pens in his book bag. How many pens does John have in his book bag?
    (b) Karen had 7 dollars. Her mother gave her some money for mowing the lawn and now she has 13 dollars. How much money did Karen's mother give her for mowing the lawn?
    (c) Bob had a full box of chocolates. He ate 4 chocolates and now he has 8 chocolates. How many chocolates were in the full box that Bob had to start with?
    (d) Rank the problems (a), (b), and (c) above in terms of difficulty. Explain your choices.

5. Jamison brought 16 crackers for a snack. He ate 9 of them. How many does he have now?
    (a) Explain how a child might solve this problem using direct modeling with manipulatives (e.g., snap cubes).
    (b) Explain how a child might solve this using a counting strategy.
    (c) Explain how a child might solve this using derived number facts.

6. Consider the problem $15-9$.
    (a) Use a Ten Frame to solve this problem. Explain where to find the answer.
    (b) Use an open number line to solve this problem. Explain where to find the answer.

7. Consider the problem 245 + 328. Demonstrate at least four of the following five: the Standard Addition Algorithm, Lattice Addition, Column Addition Method, Partial Sums Method, Open Number Line.

8. Michael knows that bees have six legs. How many legs do 4 bees have? Consider the models below:

Model A:

Model B:

6	6	6	6
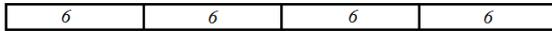
(a) Which model—Model A or B—would be considered a more sophisticated model? Why?
(b) Express the answer to the original question using
     (1) an array,
     (2) symbolic addition, and
     (3) symbolic multiplication.

9. What multiplication problem is modeled below? How do you know? Support your work with the Partial Products Algorithm.
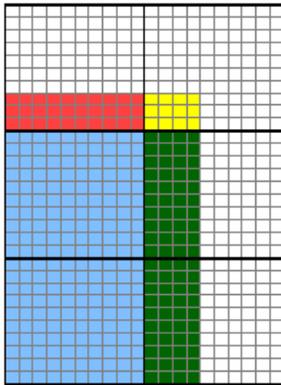
10. Consider the problem 351×218. Solve this problem by using
     (a) a nonproportional array with partial products.
     (b) Lattice Multiplication