Math 246 Review 2:

1. Draw a bar diagram to show how to solve each of the following word problems, and write the associated equations:

- Addition and subtraction bar diagrams need labels
- Multiplicative comparison bar diagrams need labels
- Other multiplication and division bar diagrams do not need labels
- Each bar diagram needs an addition or multiplication equation (which may be a missing part equation)
- Some bar diagrams should also have a subtraction or division equation.

a. Sandra had 4 erasers left after she gave 7 erasers to her friends. How many erasers did she start with?
b. Marie has 8 blue balloons and 5 red balloons. How many more red balloons than blue balloons does she have?
c. Kyle has 9 transformers. He has 3 more than his sister. How many does his sister have?
d. Amanda has 6 origami cranes. How many more does she need to make to have 10 origami cranes?
e. Paul had 14 cookies. He gave some to his brother, and now he has 8. How many cookies did he give to his brother?
f. A tootsie roll costs 4¢. Ross has 24¢. How many tootsie rolls can he buy?
g. A toy train can go 20 feet in 5 seconds. How many feet can it go in one second?
h. A Jar of jam has 8 ounces of jam in it. How many ounces of jam are in 5 jars?
i. John has 4 pencils. Nathan has 5 times as many pencils as John. How many pencils does Nathan have?
j. Kyle has 24 crayons. He has 3 times as many crayons as Clara. How many crayons does Clara have?

2. Show **two ways** of doing each calculation that are **different from the standard algorithm**
a.36 + 29 c. 92 - 38

3. Explain (using appropriate base 10 language) the following two steps in the standard subtraction algorithm:

$$\begin{array}{r} 6\ 2\ 8 \\ -\ 2\ 9\ 3 \\ \hline 5 \end{array} \Rightarrow \begin{array}{r} 5\ 12 \\ \not{6}\ \not{2}\ 8 \\ -\ 2\ 9\ 3 \\ \hline 5 \end{array} \Rightarrow \begin{array}{r} 5\ 12 \\ \not{6}\ \not{2}\ 8 \\ -\ 2\ 9\ 3 \\ \hline 3\ 5 \end{array}$$

4. Show how to solve each of these using the appropriate expanded algorithm:
a. 478 + 394 b. 723 – 186 c. 246 × 87

5. Show how to solve the following problem using scaffolding division in a way that uses easier multiplication facts than the most efficient solution:
8081 ÷ 12

6. a. Explain how knowing the commutative law of multiplication helps children learn the multiplication facts
b. Draw a diagram and write an (in words) explanation that shows why the commutative law of multiplication makes sense (you may show it for a specific example)

7. a. Explain how knowing the distributive law of multiplication over addition helps children learn the multiplication facts
b. Draw a diagram and write an (in words) explanation that shows why the commutative law of multiplication makes sense (you may show it for a specific example)

8. Write **a.** a partition and **b.** a measurement division word problem for $36 \div 4$.

9. Write a word problem for 32×14

10. Show how to compute 438×49 using the lattice algorithm

11. a. Show how to compute $\begin{array}{r} 5\ 4\ 8 \\ \times\ \ 3\ 7 \\ \hline \end{array}$ using the standard algorithm.
b. Before computing 3×8 in the standard algorithm we write a 0 in the partial product. Explain why we write a 0 there.
c. When we computer $3 \times 8 = 24$ on the standard algorithm, we write 4 in the tens place, and we write 2 above the tens place. Why does 4 go in the tens place, and why does 2 go above the tens place?

12. a. Sketch an array diagram for: 57×82
b. Write out the product using the expanded algorithm
c. Write out the product using the standard algorithm
d. Color code or label to show how the solutions in a, b, c show the same partial products.

13. a. Write a division problem with a remainder where the answer that makes sense is the quotient
b. Write a division problem with a remainder where the answer that makes sense is the quotient+1

14. Analyze and explain an error pattern or an alternate algorithm for addition, subtraction, multiplication or division.

15. Show two ways of figuring out 4×9 using efficient strategies.

16. Show two ways of figuring out 6×7 using efficient strategies.

17. a. Show what a direct modeling type picture (so you could count each object to find the answer) of a partitive division solution for $19 \div 5$ would look like.
b. Show what a direct modeling type picture (so you could count each object to find the answer) of a partitive division solution for $19 \div 5$ would look like.

18. In the standard division algorithm as done with base 10 blocks:

```
      458
   ┌─────
4 ) 1834
    16
    ──
     23
     20
     ──
      34
      32
      ──
       2
```

a. What does 5 represent?

b. What does 23 represent?

c. What does 20 represent?

d. What does 34 represent?

19. In this pattern, we are looking for the number of toothpicks it takes to build a stage *n* design. Find and carefully explain an equation for the pattern: