Math 125 – Exam #2 NAME: _____

Instructions: ***Show all required work. Circle your final answers. If a question asks for an explanation, do not just do the math but use complete sentences to explain your thinking.***

1. Evaluate the following addition problem using the **standard algorithm** and **partial sums** method.

$$648 + 533$$

2. Answer the following questions about the subtraction problem "$1356 - 427$"

   a) Evaluate the following using **base block diagrams** (draw the blocks).

   b) Next, evaluate it using the **standard algorithm** and the **equal additions** method.

   c) Below is the work of one of your students who solved this problem using the "negatives" method. If their work is correct, **explain how they did it and why it worked**. If it is incorrect, **explain the incorrect step(s) and why**.

$$\begin{array}{r} 1356 \\ -\ 427 \\ \hline -1 \\ 30 \\ -100 \\ 100 \\ \hline 29 \end{array}$$

3. Solve the following problems **mentally (exactly)** and **explain your strategy clearly**. If you just solve it on paper without explaining you won't get any points.

   a) $301 - 289$

   b) $\$20.29 - \$7.36 + \$8.71$

   c) 72×25

4. A new computer originally marked at $\$789.99$ is on sale for 14% off the listed price. What is its sale price?
   a) **Estimate** the sale price **mentally**. **Explain** and draw a percentage bar to help your argument.

   b) Is your estimate from (a) an over-estimate or an under-estimate of the exact sale price? Why? **Explain**.

5. **Explain** how you could solve the multiplication problem "13×5" using **repeated addition**. You don't need to write a story problem on this one.

6. Write a story problem to model the following operations. Use at least one continuous quantity.

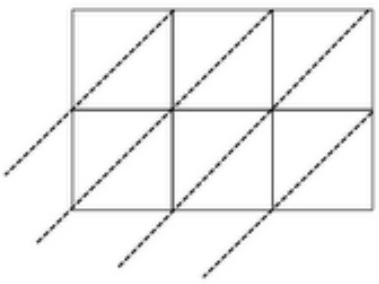
    a) Subtraction using the **missing addend** model

    b) Multiplication using the **fundamental counting principle**

    c) Division using the **repeated subtraction** model

7. Evaluate the following multiplication problem using the **standard algorithm** and the **lattice method**.

$$342 \times 72$$



8. Evaluate the following division problem using the **standard algorithm** and **partial quotients (scaffolding) algorithm:** "$3{,}524 \div 15$"

9. "33×92" could be estimated in the following ways: (a) 30×90 (b) 33×90 (c) 30×92.

   a) Which estimate is the more accurate? **Explain**.

   b) If you were estimating the cost of 33 pens which cost 92¢ each, would you estimate it differently? **Explain**.

10. Tina was asked to find "68×43" and she solves it in her head. Below is her solution.

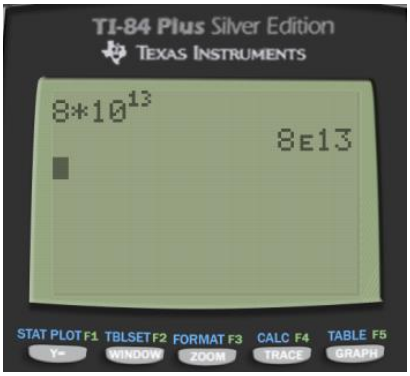
    "Well 70 times 40 is 2800 and you also need the 3 to make 210. So I know 70 times 43 is 3010. But then take away 86. So if I take away 100 that is 2910 but put back 14 I get 2924. So 2,924 is the answer."

    If she did it correctly, **explain what she did and why it worked**. If not, **explain where she went wrong**.

11. Answer the following questions involving **scientific notation**.

a) Convert 0.00003807 into **scientific notation**.

b) Scientific and graphing calculators sometimes use the following notation "$8\text{E}13$" to represent scientific notation. Convert this into to **decimal notation**.



The speed of light, commonly denoted by c, is a number in physics which describes the maximum speed at which a massless particle can travel at. Below is an approximation for the speed of light.

$$c \approx 300{,}000{,}000 \text{ (in meters/seconds)}$$

c) Convert this c into **scientific notation**.

$E = mc^2$ is a very famous equation in physics discovered by Albert Einstein, where E stands for the kinetic energy stored within a body with mass m. Typically the mass is measured in kilograms and the energy is measured in Joules. A typical cat weights around 4 kg.

d) Calculate the energy of a typical cat by converting to scientific notation first.

$$E = 4 \times 300{,}000{,}000 \times 300{,}000{,}000$$