October 28, 2010

Name: _____
Section: _____

MA 201: Exam I Practice

Please read the following carefully.

- There are 10 questions on this exam and there are 10 points possible for each question. The exam is worth 100 points total.
- You may use a simple calculator but you may not use a cellphone or calculator which stores notes.
- For any question which asks you to explain something you must write in complete English sentences. You can lose points for incomplete or incomprehensible explanations.
- For any computation problem you must show all work. You will lose points if it is not made clear how you arrive at an answer.
- Follow all instructions carefully. If a problem says to use a particular method, you *must* use that method. No points can be awarded if you fail to use the specified method.
- Relax and don't spend too much time on any one problem! Good luck.

Question	Possible	Earned
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total:	100	

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MA 201: Exam II Practice

1. If a and b are whole numbers both divisible by c prove that $a - b$ is also divisible by c.

2. Prove that the product of an even number and an even number is always an even number.

3. Which of the numbers $3, 5$, and 13 are divisors of 774,544,680? Explain your answers with 1-3 sentences each.

4. (a) Give the definition for the greatest common divisor of the numbers a and b.
   (b) Give the definition for the least common multiple of the numbers a and c.
   (c) Find the greatest common divisor of the numbers 630 and 60.
   (d) Find the least common multiple of the numbers 630 and 60.

5. Mark the following as true or false. Explain each answer with one sentence, giving examples where appropriate.
   (a) Every whole number larger than 1 can be written as a product of prime powers.
   (b) One way to find the least common multiple of a and b is to just multiply a and b together.
   (c) The least common multiple of a and b is less than or equal to $a \cdot b$.
   (d) Suppose $d = \text{GCD}(a, b)$. Then d divides and a and d divides b.

6. (a) Demonstrate the addition $133 + 199$ with blocks, strips, and mats. Indicate all exchanges that you make.
   (b) Demonstrate the addition $133 + 199$ with place value diagrams. Indicate all exchanges that you make.
   (c) Consider the arithmetic problem:

$$\begin{array}{r} 1 \\ 29 \\ +15 \\ \hline 44 \end{array}$$

   Explain why it is misleading to say that we "carry the one" when we add the 9 and 5 digit. Describe this step in a more conceptually relevant way.

7. (a) Explain the missing factor model of division.
   (b) Show a 3rd grade student how to solve $72 \div 9$ with the missing factor model. You may assume that the 3rd grader has a multiplication table but *does not know anything about algebra.* You will lose points if you write something the 3rd grader won't understand.
   (c) Use the missing factor model to explain to a group of older students why $a \div 0$ is not defined for the case where $a \neq 0$. Also, provide an intuitive explanation (or example) of why $a \div 0$ does not make sense.

8. (a) Convert 32 to base five.

   (b) Convert $(133)_{five}$ to base ten.

   (c) Compute $(212)_{five} + (323)_{five}$ in base five.

9. (a) Use expanded notation to compute $21 \cdot 415$.

   (b) Compute $21 \cdot 415$ with the instructional algorithm.

   (c) Explain how the computation in parts (a) and (b) are related.

10. (a) Use repeated subtraction (taking many multiples at a time) to compute $12,082 \div 9$.

    (b) Use the scaffold method to compute $12,082 \div 9$.

    (c) Explain how the computations in (a) and (b) are related.

11. Below you have an arithmetic problem and a model. Come up with an appropriate word problem for the arithmetic problem and solve it using the model. Draw diagrams and show lots of work.

    (a) $5 \cdot 5$ in the multiplication tree model.

    (b) $45 \div 5$ in the repeated subtraction model.