

Math 200 - 2nd Final Exam

December 15, 2010

Name _____

Score _____

Show all work to receive full credit. Supply explanations where necessary. Multiple choice problems are worth 0, 1, or 2 points depending on your answer and the work shown.

1. Choose the division model that best fits the following problem situation: *Sammy's mother made 36 cookies for the school bake sale. She would like to put them into bags that hold 4 cookies each. How many bags does she need?*
 - (a) partition
 - (b) missing factor
 - (c) repeated subtraction
 - (d) Cartesian product
2. Which one of the following facts illustrates the commutative property of multiplication?
 - (a) $(2 + x) + y = y + (2 + x)$
 - (b) $3 \cdot (x + 7) + 2 = 3x + 23$
 - (c) $3(2)(x + y) = 2(3)(x + y)$
 - (d) $(2x + 3y) + 8 = 2x + (3y + 8)$
3. What is the value of the digit 5 in the base-eight numeral 6543_{eight} ?
 - (a) 5
 - (b) $5 \cdot 64$
 - (c) 500
 - (d) $5 \cdot 512$
4. Suppose $A = \{x, y, z\}$, $B \subseteq A$, and $n(B) = 3$. Which one of the following must be true?
 - (a) $(x, x) \in A \times B$
 - (b) $A \cap B = \emptyset$
 - (c) $n(A \cup B) = 6$
 - (d) $B - A = 3 - x - y - z$
5. Which one of these fractions is in lowest terms?
 - (a) $6/111$
 - (b) $81/35$
 - (c) $51/85$
 - (d) $5/40$

6. Choose the multiplication model that best fits the following problem situation: *The graduates walked into the auditorium as a group in ten rows of four. How many graduates were there?*
- (a) Cartesian product
 - (b) repeated addition
 - (c) area/array
 - (d) set partition
7. Convert the base-ten numeral 372 to base-four.
- (a) 11310_{four}
 - (b) 78_{four}
 - (c) 1131_{four}
 - (d) 1032_{four}
8. When using the 4-step, problem-solving process which one of these strategies would NOT be considered part of understanding the problem?
- (a) Reread the problem.
 - (b) State the problem in your own words.
 - (c) Determine what information is not needed.
 - (d) Write an equation.
9. Suppose $A = 2^3 \cdot 5^2 \cdot 7 \cdot 13^3$ and $B = 2 \cdot 3 \cdot 5^3 \cdot 13^2$. Find the LCM of A and B .
- (a) $2 \cdot 3 \cdot 5^2 \cdot 7 \cdot 13^2$
 - (b) $2^3 \cdot 3 \cdot 5^3 \cdot 7 \cdot 13^3$
 - (c) $2 \cdot 5^2 \cdot 13^2$
 - (d) $2^4 \cdot 3 \cdot 5^5 \cdot 7 \cdot 13^5$
10. Which one of these numbers is the 1371st term of the following arithmetic sequence?
- $18, 25, 32, 39, 46, 53, 60, 67, \dots$
- (a) 9608
 - (b) 9615
 - (c) 9601
 - (d) 9597

11. Which one of the following is an example of inductive reasoning?

- (a) $2(3 + 5) = 2(5 + 3)$
- (b) A sequence begins with 2,4,6,8. The next term must be 10.
- (c) If $x = 10$, then $2x + 3 = 23$.
- (d) Wednesdays are pizza days, so today is a pizza day.

12. Let W be the set of all whole numbers. The set A is defined below using set-builder notation. Which one of the given sets is equal to A ?

$$A = \{x \mid x = 2n \text{ where } n \in W \text{ and } n < 2\}$$

- (a) $\{0, 2\}$
- (b) $\{0, 1\}$
- (c) $\{0, 2, 4, 6, \dots\}$
- (d) $\{\dots, -6, -4, -2, 0, 2\}$

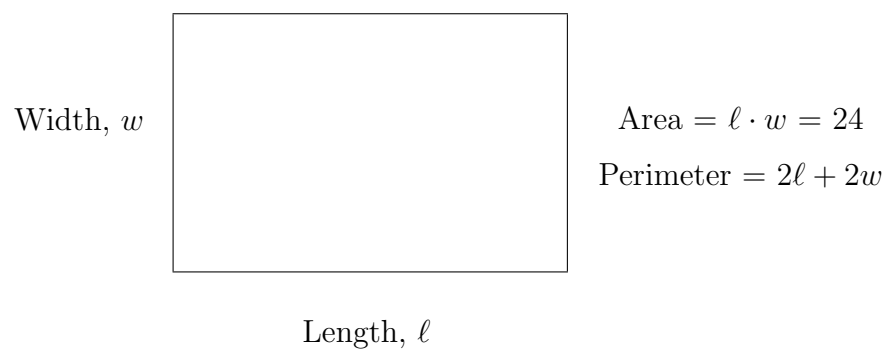
13. Compute $\frac{81}{20} \div \frac{60}{36}$ and write your answer in lowest terms.

- (a) $81/13$
- (b) $243/100$
- (c) $27/4$
- (d) $3/1600$

14. (5 points) Use any multiplication algorithm to compute $423_{\text{five}} \times 314_{\text{five}}$.

15. (5 points) Test the number 749968830 for divisibility by 2, 3, 4, 5, 6, 8, 9, 10, and 20. Show work and/or explain your reasoning.

16. (5 points) The area of a rectangle is 24 square inches. Its length and width are natural numbers. Use this information to find the rectangle with the least possible perimeter.



17. (5 points)

- (a) Find the fourth term of the geometric sequence whose first term is 3 and whose ratio is 5.

- (b) A recursive sequence is defined as follows:

$$B_1 = -2, \quad B_n = -3 \cdot B_{n-1} + 5, \text{ for } n = 2, 3, 4, \dots$$

Find the third term of the sequence.

- (c) Find the next term: 2, 4, 9, 17, 28, 42, ...

18. (5 points) Suppose A and B are subsets of U , and U has 36 elements. Use a two-set Venn diagram to help you determine $n(B)$ if $n(A) = 16$, $n(A \cap B) = 9$, and $n(\overline{A \cup B}) = 8$.

19. (5 points) Use a model to illustrate and compute each product. (Model what is given, not a related problem.)

(a) $3 \times \frac{1}{2}$

(b) $\frac{1}{2} \times \frac{3}{4}$

(c) $-3 \times (-2)$

20. (2 points) After looking at these examples:

$$5 \cdot 3 + 5 \cdot 5 = 40, \quad 5 \cdot 2 + 5 \cdot 4 = 30, \quad 5 \cdot 8 + 5 \cdot 10 = 90,$$

Marcus conjectured that the sum of two multiples of 5 is a multiple of 10. Is he correct? If not, give a counterexample.

21. (5 points) Find the prime factorization of 4500. Then use your factorization to determine the number of positive integer divisors of 4500.

22. (5 points) Use a NONSTANDARD algorithm to compute each of the following.

(a) $5686 + 6679$

(b) $345 - 269$

(c) $6745 \div 5$

23. (2 points) State a basic property of the Hindu-Arabic numeration system.

24. (1.5 points) In a sentence or two, describe how to find $9/8$ on the number line.

25. (1.5 points) Write the expanded form of the number 54967.

26. (2 points) Use an integer subtraction model to illustrate and compute $-2 - (-5)$.