

Math 200 - Final Exam

December 12, 2012

Name key

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 subtraction model that best fits the following problem situation: *Oscar must earn a total of \$35 for a field trip. He has already earned \$17. How much more must Oscar earn?*
 - (a) missing factor
 - (b) comparison
 - (c) take away
 - (d) missing addend
2. Which one of the following numbers is NOT prime?
 - (a) 17
 - (b) 41
 - (c) 1
 - (d) 2
3. Based on his performance throughout the semester, Julio made the following conjecture: *If the sun is shining when I take an in-class quiz, I will fail the quiz.* Which of the following would provide Julio with a counterexample?
 - (a) A take-home quiz that he fails when the sun is shining.
 - (b) An in-class quiz that he fails when the sun is shining.
 - (c) An in-class quiz that he passes on a dark, rainy day.
 - (d) An in-class quiz that he passes when the sun is shining.
4. If A and B are nonempty sets of numbers, describe an element of $A \times B$.
 - (a) a number that is in both A and B
 - (b) a number that is in A or B
 - (c) an ordered pair of numbers from A and B , respectively
 - (d) a number that is the product of a number in A and a number in B
5. Convert to a numeral in base ten: 4352_{six}
 - (a) 1004
 - (b) 4352
 - (c) 6024
 - (d) 32052

$$4 \times 6^3 + 3 \times 6^2 + 5 \times 6 + 2$$

$$= 4 \times 216 + 3 \times 36 + 5 \times 6 + 2$$

$$= 1004$$

6. Choose the division model that best fits the following problem situation: *Martha is rationing her 36 Hershey's Kisses so that she can eat 4 each day. For how many days can Martha eat her Kisses?*

- (a) set (partition)
- (b) repeated subtraction
- (c) missing factor
- (d) take away

7. When using the 4-step, problem-solving process, which one of these strategies would be considered part of looking back?

- (a) Keep accurate record of your work.
- (b) Check each step.
- (c) Consider other possible solution methods.
- (d) Write an equation.

8. What type of reasoning are you using when you draw a conclusion based on observation?

- (a) Recursive thinking
- (b) Inductive reasoning
- (c) Circular reasoning
- (d) Deductive reasoning

9. What is the name of the type of sequence shown here?

3, 12, 48, 192, 768, ...

- (a) Geometric sequence
- (b) Arithmetic sequence
- (c) Figurate sequence
- (d) Random sequence

10. Which one of the fractions below is not equivalent to $\frac{20}{12}$?

- (a) $\frac{200}{120}$
- (b) $\frac{5}{3}$
- (c) $\frac{340}{204}$
- (d) $\frac{1820}{1274}$

11. The GCD of 182 and 520 is 26. What is the LCM of 182 and 520?

- (a) 26
- (b) 3640
- (c) 94640
- (d) 4160

$$LCM = \frac{182 \cdot 520}{26} = 3640$$

12. Find the 915th term of the following arithmetic sequence:

1, 5, 9, 13, 17, 21, 25, ...

- (a) 3660
- (b) 3661
- (c) 3657
- (d) 2915

$$N^{TH} \text{ TERM} = 4N - 3$$

$$915^{TH} \text{ TERM} = 4(915) - 3 = 3657$$

13. Which one of the following divisibility tests is incorrect?

- (a) A whole number is divisible by 4 if the number formed by its last two digits is divisible by 4.
- (b) A whole number is divisible by 12 if it is divisible by both 2 and 6.
- (c) A whole number is divisible by 8 if the number formed by its last three digits is divisible by 8.
- (d) A whole number is divisible by 9 if the sum of its digits is divisible by 9.

14. Suppose x is a negative integer and y is a positive integer. What is the sign of $-x - (-y)$?

- (a) positive
- (b) negative
- (c) zero
- (d) more information is required

$$-x + y = \text{pos} + \text{pos} = \text{pos}$$

15. Choose the multiplication model that best fits the following problem situation: *Fred gave 6 trading cards to each of his 4 best friends. How many cards did Fred give away?*

- (a) Cartesian product
- (b) repeated addition
- (c) set (partition)
- (d) missing factor

(1) UNDERSTAND THE PROBLEM

(2) DEVISE A PLAN

(3) CARRY OUT THE PLAN

(4) LOOK BACK

16. (5 points) Each of the following strategies is associated with one of the four steps of the problem-solving process. Write the number of the step (1, 2, 3, or 4) that corresponds to each strategy.

(a) Think about other problems for which the techniques apply. 4

(b) What information is missing or not needed? 1

(c) Check each step as you proceed. 3

(d) State the problem in your own words. 1

(e) Work backward. 2

(f) Identify a subgoal. 2

(g) Look for a pattern. 2

(h) What are the unknowns? 1

(i) Check your solution in the original wording of the problem. 4

(j) Examine special cases. 2

17. (5 points) Of the following division problems, choose the one whose result is not defined. Then **carefully** explain why it is not defined.

$$0 \div 4, \quad \frac{1}{2} \div \frac{5}{7}, \quad -9.75 \div 1, \quad \textcircled{3 \div 0}$$

$3 \div 0 = C$ IF AND ONLY IF C IS THE

UNIQUE NUMBER SUCH THAT $0 \cdot C = 3$.

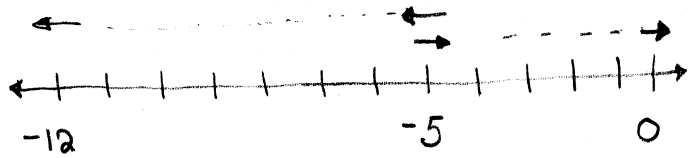
THERE IS NO SUCH NUMBER C !

$\Rightarrow 3 \div 0$ IS NOT DEFINED.

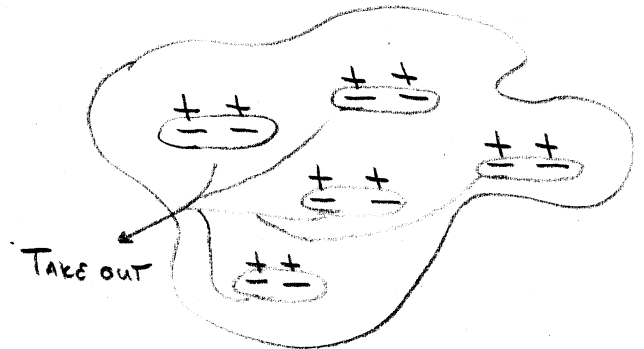
18. (5 points) Use a model to illustrate and compute each of the following.

(a) $-5 - 7$

- 1) START AT ZERO FACING RIGHT.
 - 2) MOVE BACKWARD 5 UNITS
 - 3) TURN AROUND
 - 4) MOVE FORWARD 7 UNITS
 - 5) END AT -12 : $-5 - 7 = -12$.
- (b) $-5 \times (-2)$



- 1) START WITH 10 +/- PAIRS
- 2) TAKE OUT 5 groups of 2 NEGS
- 3) END WITH $+10$: $-5 \times (-2) = 10$

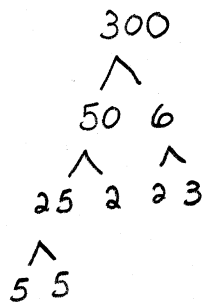
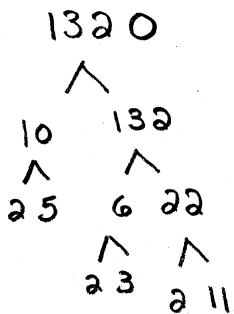


(c) $4 - (-5)$

$$\begin{aligned} 4 - 3 &= 1 \\ 4 - 2 &= 2 \\ 4 - 1 &= 3 \\ 4 - 0 &= 4 \\ 4 - (-1) &= 5 \end{aligned}$$

$$\begin{aligned} 4 - (-2) &= 6 \\ 4 - (-3) &= 7 \\ 4 - (-4) &= 8 \\ 4 - (-5) &= 9 \end{aligned}$$

19. (5 points) Find the prime factorizations of 1320 and 300. Then use the prime factorizations to find the greatest common divisor and least common multiple. (Be sure to label which is which.)



$$\begin{aligned} \text{LCM} &= 2^3 \cdot 3 \cdot 5^2 \cdot 11 \\ \text{GCD} &= 2^2 \cdot 3 \cdot 5 \end{aligned}$$

$$1320 = 2^3 \cdot 3 \cdot 5 \cdot 11$$

$$300 = 2^2 \cdot 3 \cdot 5^2$$

20. (5 points) Use a NONSTANDARD algorithm to compute each of the following.

(a) $4758 \div 6$

$$\begin{array}{r} 793 \\ 6 \overline{) 4758} \end{array}$$

SHORT DIVISION

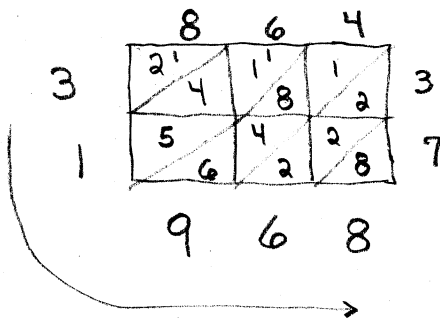
(b) $423 - 267$

EQUAL ADDITIONS

$$\begin{array}{r} 423 + 3 \\ - 267 + 3 \\ \hline 156 \end{array}$$

(c) 864×37

LATTICE



31,968

21. (5 points) Clearly state the rule for adding two integers with opposite signs. Give an example that illustrates your rule. Be absolutely certain that your example actually shows what your rule says!

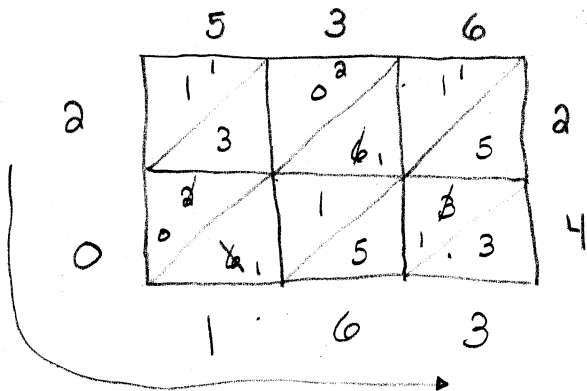
SUBTRACT THE ABSOLUTE VALUES, LEAST FROM GREATEST,
AND GIVE THE RESULT THE SIGN OF THE ORIGINAL
ADDED WITH THE GREATEST ABSOLUTE VALUE.

Ex

$$-9 + 6 = -(9 - 6) = -3$$

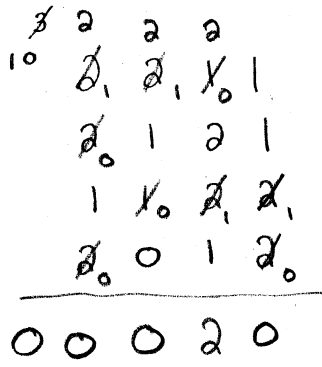
22. (5 points) Use any algorithm to compute each of the following.

(a) $536_{\text{seven}} \times 24_{\text{seven}}$



20,163 SEVEN

(b) $2211_{\text{three}} + 2121_{\text{three}} + 1122_{\text{three}} + 2012_{\text{three}}$



100,020 THREE

23. (5 points) Clearly state each of the following divisibility tests.

(a) Test for divisibility by 8

A NUMBER IS DIVISIBLE BY 8 IF AND ONLY IF ITS LAST THREE DIGITS FORM A NUMBER DIVISIBLE BY 8.

(b) Test for divisibility by 5

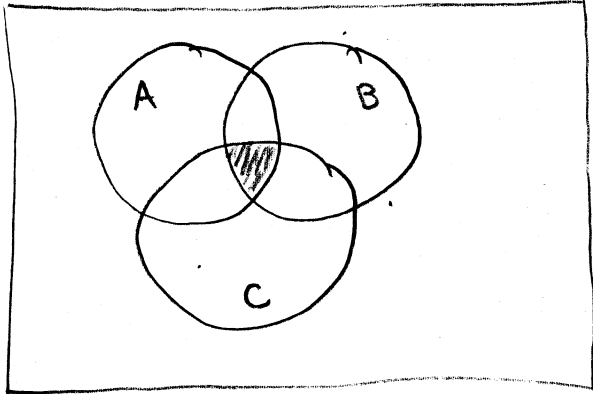
A NUMBER IS DIVISIBLE BY 5 IF AND ONLY IF ITS LAST DIGIT IS 5 OR 0.

(c) Test for divisibility by 9

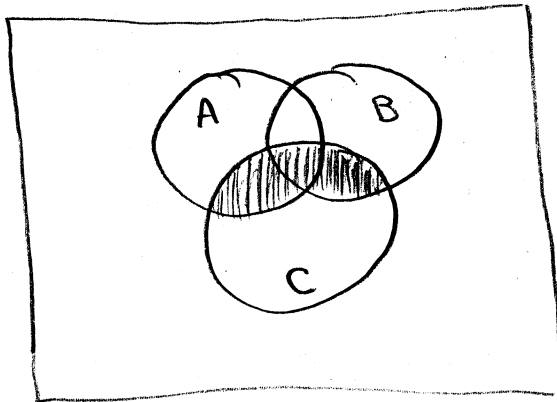
A NUMBER IS DIVISIBLE BY 9 IF AND ONLY IF THE SUM OF ITS DIGITS IS DIVISIBLE BY 9.

24. (5 points) For each part of the problem, sketch a three-set Venn diagram and shade the region corresponding to the given operation.

(a) $A \cap B \cap C$



(b) $(A \cup B) \cap C$



(c) $B - (A \cup C)$

