

**Math 200 - Test 2**  
March 14, 2012

Name \_\_\_\_\_

Score \_\_\_\_\_

Show all work to receive full credit. Supply explanations where necessary.

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- (1 point) Which property justifies the following fact:  $(x + y) + 7 = 7 + (x + y)$ ?
  - Associative property of addition
  - Commutative property of addition
  - Closure property of whole-number addition
  - Distributive property of multiplication over addition
- (2 points) Use any addition algorithm to compute  $323_{\text{four}} + 133_{\text{four}} + 322_{\text{four}} + 313_{\text{four}}$ .
  - $1091_{\text{four}}$
  - $1121_{\text{four}}$
  - $3122_{\text{four}}$
  - $3023_{\text{four}}$
- (1 point) Choose the subtraction model that best fits the following problem situation:  
*Al has read 4 chapters of a 9-chapter book. How many chapters does he have left to read?*
  - comparison model
  - take-away model
  - set partition model
  - missing addend model
- (1 point) Suppose  $A$  and  $B$  are sets with  $n(A) = 12$  and  $n(B) = 4$ . Determine  $n(B \times A)$ .
  - 16
  - 48
  - $(4, 12)$
  - $(12, 4)$
- (1 point) Choose the multiplication model that best fits the following problem situation:  
*The local sub shop offers 7 different bread choices and 9 different meat choices. How many different bread-meat combinations are possible?*
  - Cartesian product model
  - set partition model
  - area/array model
  - repeated addition model

6. (1 point) What is the value of the digit 7 in the numeral  $6782_{\text{nine}}$ ?
- (a) 567
  - (b) 7
  - (c) 700
  - (d) 81
7. (1 point) What base-six number immediately follows  $5355_{\text{six}}$ ?
- (a)  $5356_{\text{six}}$
  - (b)  $5360_{\text{six}}$
  - (c)  $5500_{\text{six}}$
  - (d)  $5400_{\text{six}}$
8. (1 point) Choose the addition model that best fits the following problem situation:  
*Marie has 7 pieces of yarn in one pile and 4 pieces of yarn in another pile. If she combines the piles, how many pieces of yarn will she have in the combined pile?*
- (a) group partition model
  - (b) set model
  - (c) Cartesian sum model
  - (d) number line model
9. (1 point) Which one of these illustrates the associative property of multiplication?
- (a)  $(7 \times y) \times 3 = 3 \times (7 \times y)$
  - (b)  $3(x + 5) = 3x + 15$
  - (c)  $(3 + z) + 7 = 3 + (z + 7)$
  - (d)  $5(xy) = (5x)y$
10. (1 point) What algorithm is being illustrated here?

$$\begin{array}{r} 72 \\ - 38 \\ \hline \end{array} \quad \longrightarrow \quad \begin{array}{r} 72 + 2 \\ - (38 + 2) \\ \hline \end{array} \quad \longrightarrow \quad \begin{array}{r} 74 \\ - 40 \\ \hline 34 \end{array}$$

- (a) scratch subtraction algorithm
- (b) fast subtraction algorithm
- (c) equal-additions algorithm
- (d) nice-numbers algorithm

11. (3 points) Write a word problem involving multiplication in which the multiplication fact is best described by the array model.

12. (3 points) Use any of the algorithms we discussed in class, except the standard algorithm, to compute  $2796 + 3458$ .

13. (4 points) Let  $Y = \{1, 2, 3\}$  and  $Z = \{a, b\}$ .

(a) Determine  $\emptyset \times Z$ .

(b) Determine  $Z \times Y$ .

(c) What is the difference between  $Y \times Z$  and  $Z \times Y$ ?

14. (3 points) Use the abstract version of the set model to illustrate  $5 + 3 = 8$ .

15. (3 points) Use any **two** of the strategies for mastering basic addition facts to compute  $8 + 6$ . To receive any credit, you must show work and explain your reasoning.
16. (3 points) Use base-five blocks to represent  $243_{\text{five}}$ . Then use your representation to determine the number's value in base ten.
17. (3 points) Use any of the algorithms we discussed in class, except the standard algorithm, to compute  $573 - 287$ .
18. (3 points) Give an example of a set that is closed under addition and an example of a set that is not closed under addition. Give a brief explanation for each set.

19. (3 points) Convert 237 to base three.

20. (1 point) State one of the important properties of the Hindu-Arabic numeration system.

21. (2 points) Rewrite each expression using the indicated property, and only that property, exactly one time.

(a) *Commutative property of multiplication:*       $y + 8(3 + w)$

(b) *Associative property of multiplication:*       $5[3(x + 2)]$

22. (2 points) List the first six natural numbers in base two.

23. (3 points) Use a multiplication model to illustrate the following fact.

$$3 \cdot (w + 2) = 3 \cdot w + 3 \cdot 2$$

24. (3 points) Use base-ten blocks to illustrate  $43 - 28$ .