

Math 200 - Test 2

March 10, 2010

Name key Score _____

Show all work. Supply explanations where necessary.

1. (1 point) Choose the division model that best fits the following problem situation:
Joleen has 8 cups of flour that she will use to make cookies requiring 2 cups of flour per batch. How many batches of cookies can Joleen make?
- (a) set partition model
 - (b) repeated subtraction model
 - (c) missing factor model
 - (d) charged field model
2. (1 point) Which one of the following is not a correct base-eight numeral?
- (a) 1001_{eight}
 - (b) 1278_{eight}
 - (c) 70701_{eight}
 - (d) 1050700_{eight}
3. (1 point) Choose the multiplication model that best fits the following problem situation:
Rodger has 4 different coats and 8 different scarfs. How many coat/scarf combinations does he have?
- (a) area/array model
 - (b) number line model
 - (c) repeated addition model
 - (d) Cartesian product model
4. (1 point) Which one of the following is not a basic property of the Hindu-Arabic numeration system?
- (a) Each number is either prime or composite.
 - (b) Place value is based on powers of 10.
 - (c) Each digit in a numeral has a face value, a place value, and a value.
 - (d) All numerals are constructed from the 10 digits.
5. (1 point) If $A = \{1, 2, 3, 4\}$ and $B = \{2, 4, 6, 8\}$, how many elements are there in $B - A$?
- (a) 0
 - (b) 2
 - (c) 4
 - (d) 8
- $B - A = \{2, 4, 6, 8\} - \{1, 2, 3, 4\}$
 $= \{6, 8\}$

6. (4 points) Suppose that U is the set of all Americans, T is the set of all American teachers, and M is the set of all American males.

(a) Describe an element of $\overline{M} - T$. = $\overline{M} \cap \overline{T}$

AN ELEMENT OF $\overline{M} - T$ IS AN AMERICAN WHO IS NOT A MALE AND IS NOT A TEACHER

(b) Describe an element of $T - M$. = $T \cap \overline{M}$

AN ELEMENT OF $T - M$ IS AN AMERICAN WHO IS A TEACHER BUT NOT A MALE, i.e. AN AMERICAN FEMALE TEACHER

(c) Describe an element of $M \cup T$.

AN ELEMENT OF $M \cup T$ IS AN AMERICAN WHO IS A MALE OR A TEACHER.

(d) Use set notation to name the set of all American male teachers.

MALE AND A TEACHER

$M \cap T$

7. (3 points) Rewrite each expression using the indicated property, and only that property, exactly one time.

(a) *Distributive Property of Multiplication over Subtraction:* $5x - 15xy$
 $5x(1 - 3y)$

(b) *Commutative Property of Multiplication:* $5 \cdot (4x + 6)$
 $(4x + 6) \cdot 5$

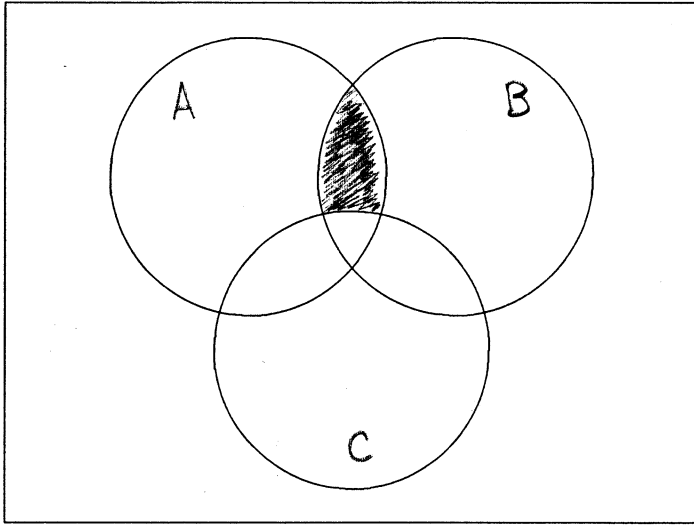
(c) *Associative Property of Addition:* $(2x + 6) + 5y$
 $2x + (6 + 5y)$

8. (2 points) Use a three-set Venn diagram on the next page (one for each part) to shade the region corresponding to each of these sets. Label your diagrams.

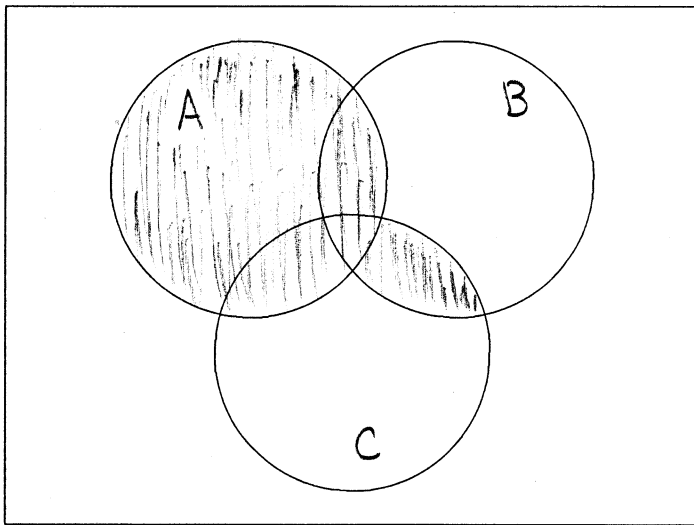
(a) $A \cap B \cap \overline{C}$ "A AND B AND NOT C"

(b) $A \cup (B \cap C)$ "A OR (B AND C)"

$$(a) A \cap B \cap \bar{C}$$



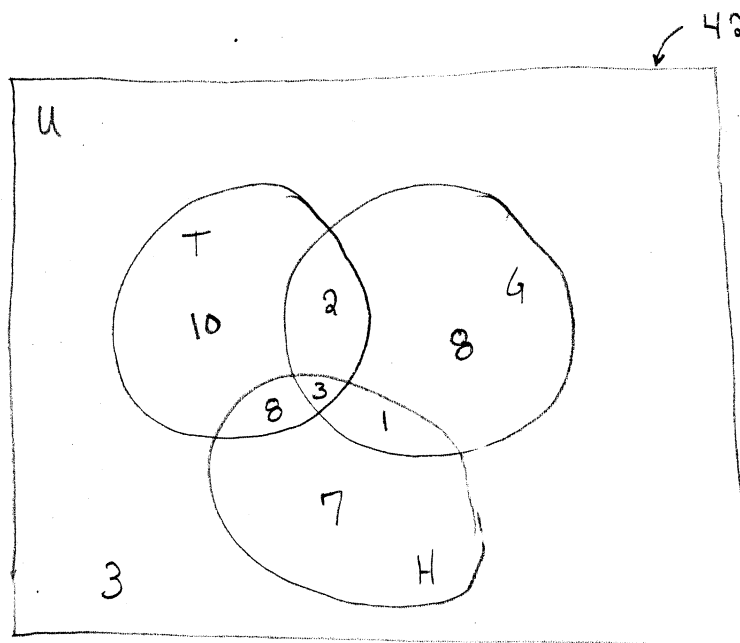
$$(b) A \cup (B \cap C)$$



9. (6 points) Ms. Baxter asked the 42 students in her two kindergarten classes to name their favorite small pets. Here is what she found:

- 23 said tarantulas
- 14 said geckos
- 19 said hermit crabs
- 5 said tarantulas and geckos
- 11 said tarantulas and hermit crabs
- 4 said geckos and hermit crabs
- 3 said all three

(a) Use a three-set Venn diagram to organize this information.



(b) How many children did not name any of these pets?

$$42 - (10 + 2 + 8 + 8 + 3 + 1 + 7) = \boxed{3}$$

(c) How many children named exactly one kind of pet?

$$\boxed{25} = 10 + 8 + 7$$

(d) How many children named tarantulas but not geckos?

$$10 + 8 = \boxed{18}$$

10. (1 point) Which one of the following sets is closed under addition?

(a) $\{0, 1\}$ $|+|$ IS NOT IN THERE

(b) $\{1, 3, 5, 7, \dots\}$ $1+3$ IS NOT IN THERE

(c) $\{1, 2, 4, 8, 16, \dots\}$ $1+2$ IS NOT IN THERE

(d) $\{0, 3, 6, 9, 12, \dots\}$

11. (1 point) Choose the subtraction model that best fits the following problem situation:
There are 5 children in the first row and 2 children in the second row. How many more children are in the first row?

(a) take-away model

(b) set partition model

(c) missing addend model

(d) comparison model

12. (1 point) What is the face value of the digit 4 in the numeral 51435_{six} ?

(a) 6^2

(b) $4 \cdot 6^2$

(c) 4

(d) 100

13. (1 point) Choose the division model that best fits the following problem situation: *To determine 56 divided by 8, Joe asked himself what times 8 is 56.*

(a) set partition model

(b) repeated subtraction model

(c) missing factor model

(d) division algorithm

14. (3 points) Convert 110111_{two} to base ten. You must show work to receive credit.

(a) 55

(b) 122

(c) 54

(d) 110

$$1 \cdot 2^5 + 1 \cdot 2^4 + 0 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0$$

$$32 + 16 + 0 + 4 + 2 + 1$$

$$= 55$$

15. (2 points) Instead of saying that $0 \div 0$ is not defined, some teachers prefer to say it is indeterminate. The word "indeterminate" means "not precisely determined or fixed." Explain why this is probably a more appropriate way to describe $0 \div 0$.

IF $0 \div 0$ EXISTS, THEN $0 \div 0$ IS THE
UNIQUE NUMBER C SUCH THAT $C \cdot 0 = 0$.

BUT THIS IS TRUE FOR ANY NUMBER C .

SO IT'S REALLY NOT THAT $0 \div 0$ IS NOT DEFINED,
IT'S THAT IT CANNOT BE DEFINED TO BE A SINGLE
(UNIQUE) NUMBER. IN THIS SENSE, $0 \div 0$ IS "NOT PRECISELY
DETERMINED."

16. (2 points) The counting-on addition strategy is sometimes used as a subtraction strategy. For example, to compute $7 - 5$, a child could start at 5 and count on to 7, keeping track of how much she counted.

- (a) Use this strategy to compute $13 - 8$.

8 ... 9, 10, 11, 12, 13
COUNTED 5 TIMES SO $13 - 8 = 5$

- (b) This strategy relates addition and subtraction. What is the name of the model that is behind this strategy?

WHAT PLUS 8 IS 13?

MISSING ADDEND MODEL

17. (3 points) Convert 1317 to base eight.

$$8^0 = 1, 8^1 = 8, 8^2 = 64, 8^3 = 512$$

$$\begin{array}{r} 8^3 = 512 \overline{) 1317} \quad (2 \\ \underline{1024} \\ 293 \\ 8^2 = 64 \overline{) 293} \quad (4 \\ \underline{256} \\ 37 \\ 8^1 = 8 \overline{) 37} \quad (4 \\ \underline{32} \\ 5 \\ 8^0 = 1 \overline{) 5} \quad (5 \end{array}$$

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18. (2 points) List the first eight counting numbers in base three.

BASE 10:	1	2	3	4	5	6	7	8
BASE 3:	1	2	10	11	12	20	21	22

19. (3 points) Write and solve a division word problem in which the problem situation best fits the set partition model.

35 CHILDREN ARE SPLIT UP INTO 7 EQUAL-SIZED GROUPS. HOW MANY CHILDREN IN EACH GROUP?

$$35 \div 7 = 5 \Rightarrow 5 \text{ CHILDREN IN EACH GROUP.}$$

20. (3 points) Use any two of the three addition strategies that we studied to help a child master that fact that $7 + 8 = 15$.

Doubles : $7 + 8 = 7 + 7 + 1 = 14 + 1 = 15$

MAKING 10 : $7 + 8 = 5 + 2 + 8 = 5 + 10 = 15$

21. (3 points) Use a rectangular array to expand and simplify $(x + 3)(x^2 + 3x + 4)$.

	x^2	$3x$	4
x	x^3	$3x^2$	$4x$
3	$3x^2$	$9x$	12

$$x^3 + 6x^2 + 13x + 12$$

22. (1 point) Which one of the following is true?
- (a) dividend equals quotient times divisor plus remainder
 - (b) divisor equals quotient times dividend plus remainder
 - (c) dividend equals quotient times remainder plus divisor
 - (d) remainder equals dividend times divisor plus quotient
23. (1 point) Choose the addition model that best fits the following problem situation:
Mary has 7 crayons and Fred has 5 crayons. If Mary and Fred combine their crayons, how many will they have?
- (a) set model
 - (b) number line model
 - (c) combination model
 - (d) adding model
24. (1 point) When doing whole number addition, which of the following is another name for zero?
- (a) the multiplicative identity
 - (b) nothing
 - (c) the additive identity
 - (d) the subtrahend
25. (1 point) What is the value of the digit 6 in the base-ten numeral 1653?
- (a) 6
 - (b) 100
 - (c) 600
 - (d) 11
26. (1 point) Choose the multiplication model that best fits the following problem situation:
The desks in our room are arranged into a 5-by-7 rectangle. How many desks are there in our room?
- (a) area/array model
 - (b) missing minuend model
 - (c) repeated addition model
 - (d) Cartesian product model