

Math 200 - Test 2

October 21, 2009

Name _____

Score _____

Show all work. Supply explanations where necessary.

1. (3 points) Suppose U is the set of all Americans, A is the set of all American smokers, and B is the set of all Americans with health problems. Describe a person who is an element of each of the following sets.

(a) $A \cap \overline{B}$

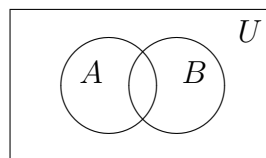
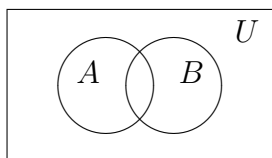
(b) $B - A$

2. (3 points) Referring to the problem above, use set notation to write each of the following sets.

(a) The set of all Americans who smoke or have health problems

(b) The set of all Americans who neither smoke nor have health problems

3. (3 points) Shade the region of the Venn diagram corresponding to (a) $(A - B) \cup (B - A)$ and (b) $\overline{A \cap B}$. Be sure to label the respective diagrams.



4. (6 points) A poll of 100 registered voters designed to find out how voters kept up with current events revealed the following facts.

- 65 watched the news on television.
- 39 read the newspaper.
- 39 listened to radio news.
- 20 watched TV news and read the newspaper.
- 27 watched TV news and listened to radio news.
- 9 read newspaper and listened to radio news.
- 6 watched TV news, read the newspaper, and listened to radio news.

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

(b) How many of the 100 people surveyed kept up with current events by some means other than the three sources listed?

(c) How many of the 100 people surveyed read the newspaper but did *not* watch TV news?

(d) How many of the 100 people surveyed used only one of the three sources listed to keep up with current events?

5. (3 points) Determine whether each of the following sets is closed under addition. Explain why or why not.

(a) $\{0, 5, 10, 15, 20, 25, \dots\}$

(b) $\{1, 3, 5, 7, 9, 11, \dots\}$

(c) $\{0, 1\}$

6. (3 points) Determine the base-three numeral that represents the number of stars shown below.



7. (3 points) Consider modeling the problem of subtracting three from eight.

(a) Model $8 - 3$ using the missing-addend approach.

(b) Model $8 - 3$ using the take-away approach.

(c) Model $8 - 3$ using the comparison approach.

8. (3 points) Rewrite each expression using the indicated property (one time) and only that property.

(a) *Commutative Property of Multiplication:* $a(4 + x)$

(b) *Distributive Property of Multiplication over Addition:* $5x + 15xy$

(c) *Associative Property of Addition:* $3x + (5 + y) + 8$

9. (3 points) Each situation described below involves a multiplication problem. In each case tell whether the problem situation is best represented by the repeated-addition model, the array model, or the Cartesian product model, and why. Then write the appropriate equation to fit the situation.

(a) A rectangular room has 1-ft by 1-ft square tiles on the floor. Along one wall, Kurt counts 15 tiles and along an adjacent wall he counts 12 tiles. How many tiles cover the floor?

(b) Carmen has 8 skirts and 7 blouses. How many different combinations of skirts and blouses does she have?

(c) A teacher provided three No. 2 pencils to each of eight students. How many pencils did the teacher dispense?

10. (3 points) Write the first twelve counting numbers in base four.
11. (3 points) A child is having trouble memorizing certain basic addition facts. Describe an addition strategy that may help the student master the addition facts.
12. (3 points) Consider the digit 4 in the number $94E8_{\text{twelve}}$.
- (a) What is its face value?
 - (b) What is its place value?
 - (c) What is its value?
13. (3 points) Use rectangular arrays to model and expand $(2x + 1)(x^2 + 3y + 2)$.

14. (3 points) Only one of these is a correctly written numeral. Convert that numeral to its base-ten equivalent, and tell what is wrong with the others.

(a) 306_{four}

(b) 3003_{five}

(c) 1023_{two}

15. (3 points) Use a multiplication model to illustrate the following fact.

$$3 \cdot (2 + 4) = 3 \cdot 2 + 3 \cdot 4$$

16. (2 points) Suppose $A \subseteq B$. If $n(A) = a$ and $n(B) = b$, then $b - a$ could be defined as $n(B - A)$. Choose two sets A and B and illustrate the definition.