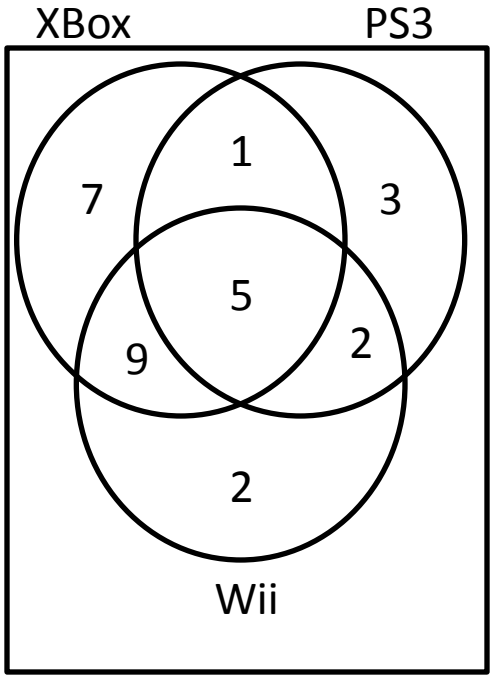
Name:

Venn Diagrams



If 40 people were surveyed in the Venn-Diagram to the left, how many students owned…

1) An Xbox _____

2) An Xbox and a PS3 _____

3) At least two consoles _____

4) An Xbox or a Will _____

5) An Xbox and PS3, but not a Wii _____

6) No console _____

If 33 people were at the party, how many people ordered pizzas with…

7) Mushrooms _____

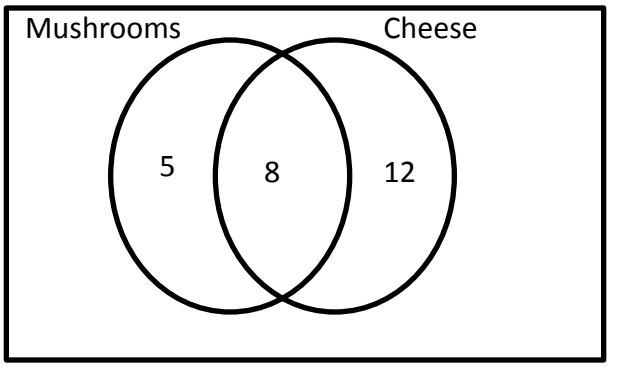
8) Cheese _____

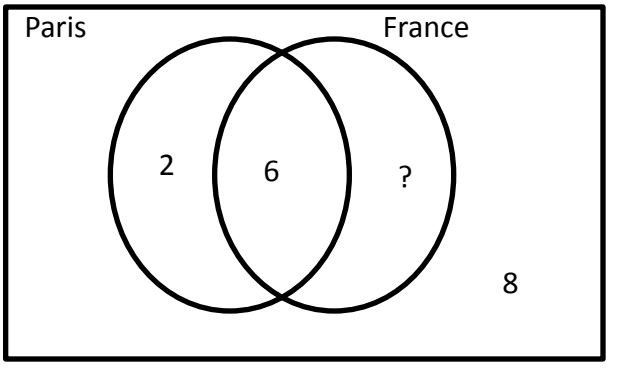
9) Just Mushrooms _____

10) Both Mushrooms and Cheese

_____

11) No pizzas _____





If 19 people were surveyed on where they had traveled to, how many had traveled to…

12) Just France _____

13) France _____

14) Both Paris and France _____

When making your own Venn-Diagram, try to **start in the MIDDLE!!!**

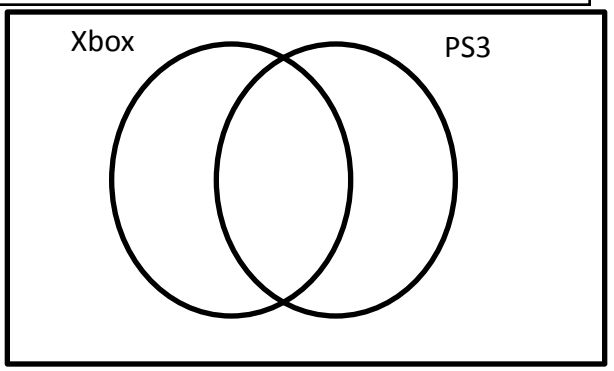
Out of 19 students surveyed, 2 students did not own an Xbox or PS3, 6 students owned a PS3 and an Xbox, and 14 students owned a PS3.

How many students owned…

15. An Xbox _____

16. Only a PS3 _____

17. Both consoles _____



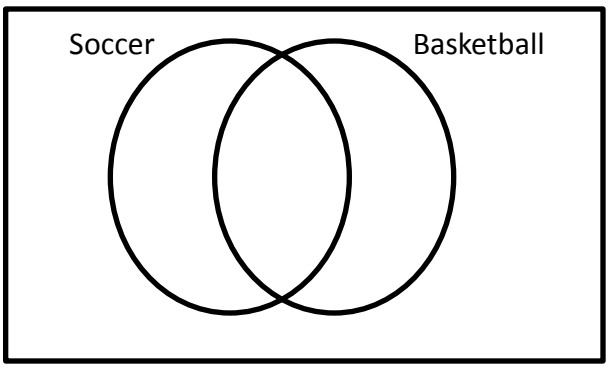
Out of 22 students surveyed, 3 did not like soccer or basketball. 7 said they only like basketball. None said they like both.

How many students liked…

18) Only soccer _____

19) Soccer or basketball _____

20) Soccer and basketball _____

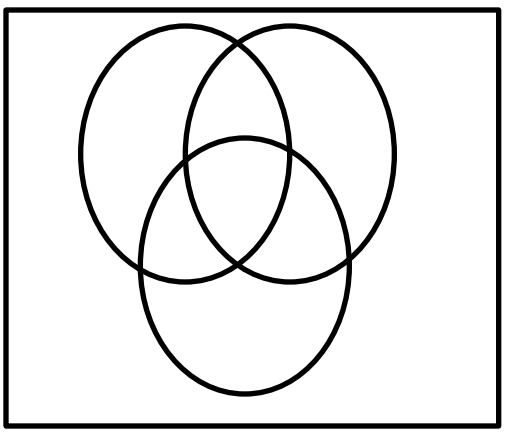


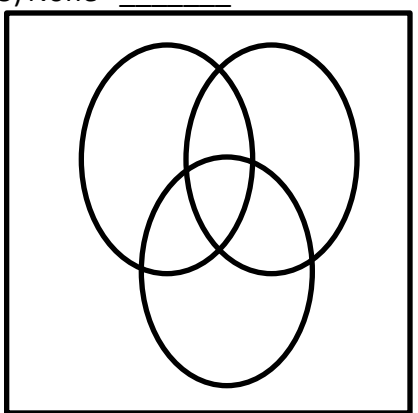
Teresa asked students in her math class whether they owned a dog, cat, or bird. Of the 35 students surveyed, 11 owned a dog, 8 owned a cat, 12 owned a bird. 3 owned a cat and dog. 5 owned a cat and bird and 3 owned a bird and dog. 2 students owned all three animals. How many students owned:

21) Only a dog? _____

22) Dog and cat, but not a bird? _____

23) None _____





Matthew was ordering pizza for his 47 friends. He took a survey to see who like pepperoni, cheese, and sausage. 3 people said they liked all three, 5 said cheese and sausage, 8 said pepperoni and cheese, and 3 said pepperoni and sausage. 5 people did not choose any of the three. 10 total like pepperoni and 14 liked sausage. How many liked:

24) Cheese _____

25) Just Cheese _____

26) Just sausage _____

Intersection, Union, and Complements

$\cap$ = intersection = what they have in COMMON, or what they BOTH HAVE

$\cup$ = union = EVERYTHING that you see in either A OR B

A^C = complement of A = everything in the universe (U) NOT in A

$A = \{0,1,2,3,\}$
$B = \{1,3,5,7\}$
$A \cap B = \{1,3\}$
$A \cup B = \{0,1,2,3,5,7\}$

Note: All answers on this page should be a set and written as: {#,#,#,#}

$U = \{0,1,2,3,4,5,6,7\}$
$A = (1,3,5,7\}$
$A^C = \{0,2,4,6\}$

A = {1,3,5,7,9,11}
B = {0,1,2,3,8,9}

1. $A \cap B =$ _____

2. $A \cup B =$ _____

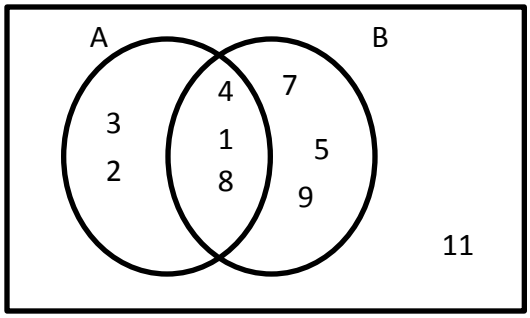
A = (2,4,6}
B = (1,3,5}

3. $A \cap B =$ _____

4. $A \cup B =$ _____

A = {-5,-2,0,2,5,9}
B = set of all whole numbers

5. $A \cap B =$ _____



6. $A \cap B =$ _____

7. $A \cup B =$ _____

8. $A^C =$ _____

9. $B^C =$ _____

10. Given the universal set is the integers from 1 through 100, describe the complement of {2,4,6,8,…100}

_____

11. Given the universal set is the integers from 1 through 27, describe the complement of {1,3,5,7,…27}

_____

12. If A = { -5, -4, 0, 4, 5} and B = {-6,-5,0,5,6}, what is the intersection of A and B?

_____

13. What is the union of A and B in #12

_____

If A = {-500, -12, -1, 1, 5, 57} and B = {-12,-1,1, 5, 22}, what is:

14. $A \cap B =$ _____

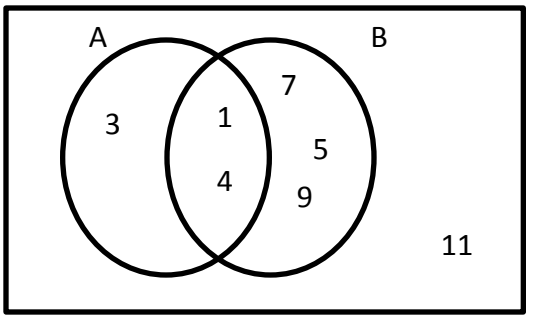
15. $A \cup B =$ _____

16. If A = the set of all integers and B = {-3,-2,-1.5,0,1.333,4}, what is the intersection of A and B?

_____

17. If A = {1,3,5,7,9} and B = {2,4,6,8}, what is the intersection of set A and B?

_____



18. $A \cap B =$ _____

19. $A \cup B =$ _____

20. $A^C =$ _____

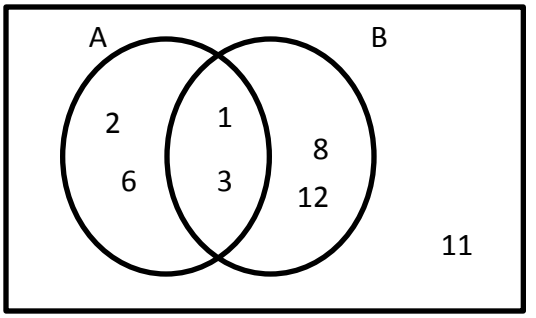
21. $B^C =$ _____

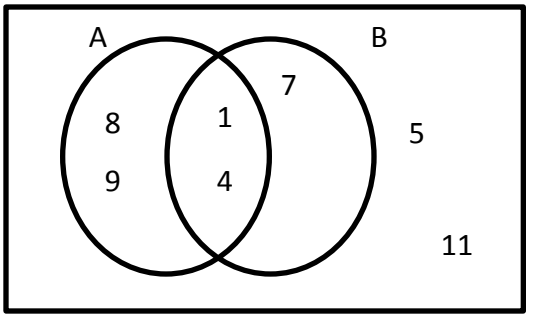
22. If U = {-5,-4,-1,0,1,3,5} and A = {-4,3,5}, which of the following describes A^C ?

A. {-5,-4,-1,0,1,3,5}
B. {-4,3,5}
C. {-5,-1,0,1}
D. {-4,0,3,5}

23. Let U = {3,5,7,9,11,12,13}
Let A = {5,7,11,13}
Find A^C

A. {3,5,7,9,11,12,13}
B. {3,9,12}
C. {5,7,11,13}
D. {2,4,6,8}





24. Given the Venn-Diagram Above, find A^C

A. {8,12}
B. {8,11,12}
C. {1,3,8,11,12}
D. {2,6}

25. Find $A \cap B =$ _____

A. {1,3}
B. {1,2,3,6,8,12}
C. {11}

26. Given the Venn-Diagram Above, find $A \cup B$

A. {5,11}
B. {1,4,,5,7,8,9,11}
C. {1,4,7,8,9}
D. {1,4}

27. Find $A \cap B$

A. {5,11}
B. {1,4}
C. {1,4,7,8,9}

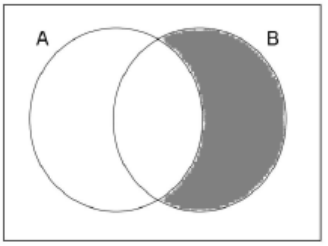
Shading Venn Diagrams

When shading Venn Diagrams, always start with the parenthesis () if they are present. You must also know what the symbols mean:

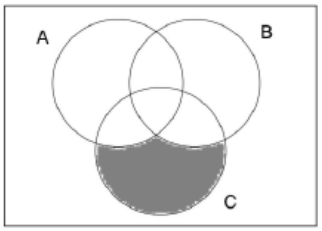
$\cap$ = "AND" = intersection = the overlapping area (the area they share)

$\cup$ = "EITHER __ OR ___" = union = either of the two sets

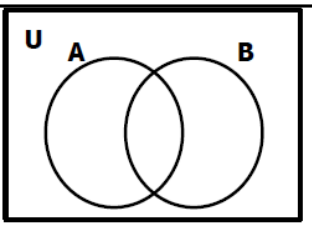
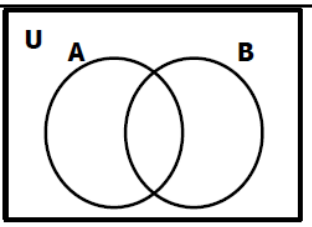
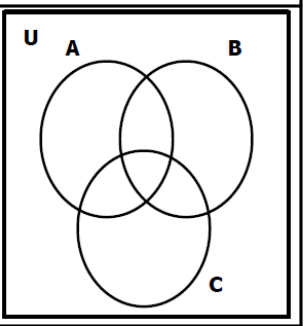
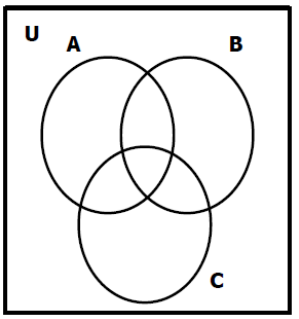
A^C = "NOT A" = complement of A = everything not in A



$A^C \cap B$ means "NOT in A AND in B" and looks like →



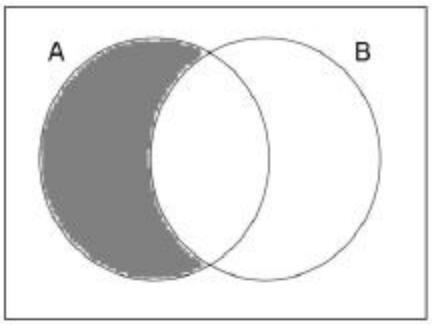
$(B^C \cap C) \cap A^C$ means "(NOT in B AND in C) AND NOT in A" and is shown to the left.

Problem	In Words	Shaded
$A \cap B^C$		
$A^C \cup B$		
$(A \cup B) \cap C^C$		
$(A \cap B) \cap C^C$		

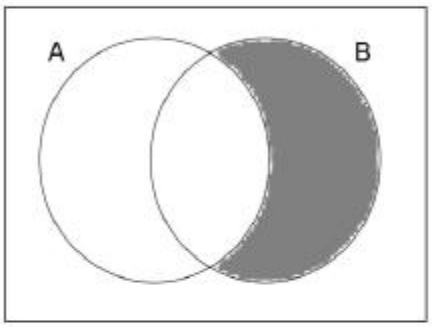
Place the letter (A,B,C, or D) of the graph below for each of the following:

1. $A \cap B^C$ _____
2. A _____
3. $A^C \cap B$ _____
4. B^C _____

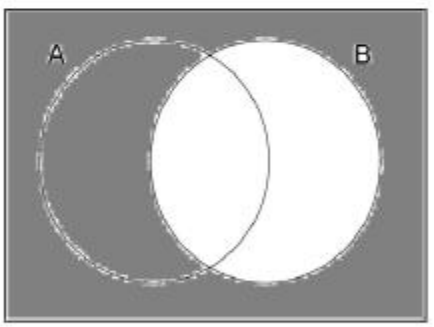
A.



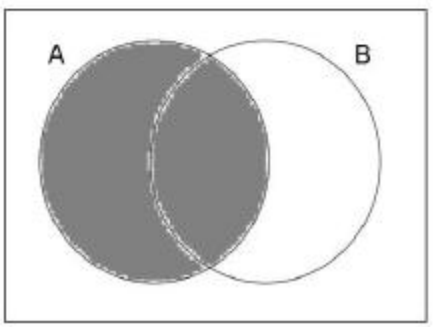
B.



C.



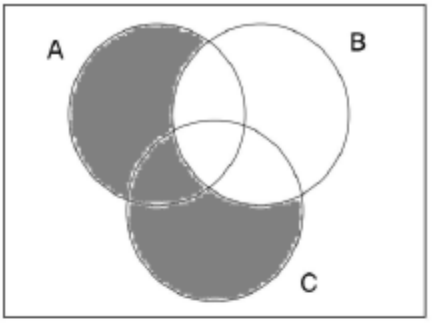
D.



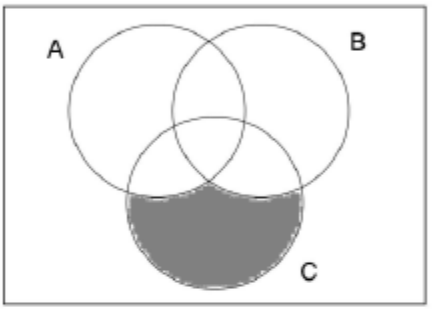
Place the letter (A,B,C, or D) of the graph below for each of the following:

5. $(A \cup C) \cap B^C$ _____
6. $(A \cup B \cup C)^C$ _____
7. $(B^C \cap C) \cap A^C$ _____
8. $(B \cap C) \cap A^C$ _____

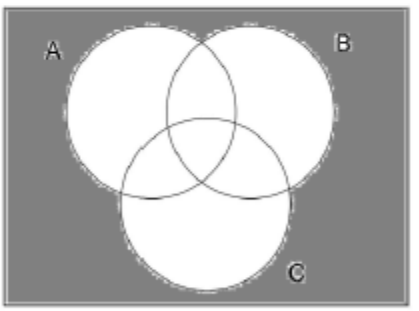
A.



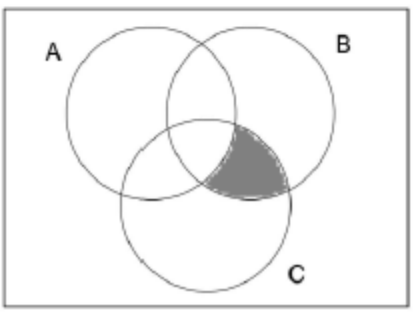
B.



C.



D.



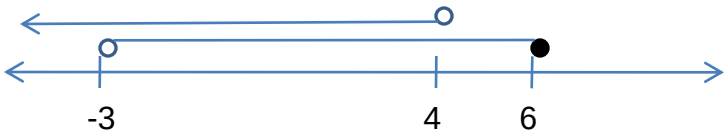
Elements and Subsets

An *element* of a set ($\in$) is anything that is found in that set. For example, there are 5 elements in the following set: {1,3,5,7,9}. $2 \notin$ because 2 is not found in the set.

A is a *subset* ($\subset$) of B if EVERY ELEMENT in A is *also* found in B. For example:
$\{1,3,5\} \subset \{-1,0,1,2,3,4,5,6,7\}$ because every element of A (1,3, and 5) is found in the second set.
$\{1,3,5\} \not\subset \{0,1,2,4,5\}$ because 3 is NOT found in the second set.

When sets are given in roster notation (with inequalities), it helps to graph the two sets on a number line:

A = {x I $-3<x\leq 6$} means the set of all numbers x such that x is between -3 and 6
B = {x I $x < 4$} means the set of all numbers x such that x is less than 4



If there are any numbers in A that are not in set B, then A is NOT a subset of B. We can see in the graph above that every number between 4 and 6 is in set A but NOT in set B. Therefore,

$A \not\subset B$

True or False

1. 3 $\in$ {1,3,5,7}
2. 4 $\notin$ the set of all odd integers
3. 2.7 $\in$ the set of all integers
4. 0 is an element of all whole numbers
5. 33 $\notin$ {1,3,5,…}
6. 28 $\in$ {2,8,14,20,….}

Classifying Real Numbers

- **Real Numbers** -2, ¾, 2.111, 1.719…,
  - **Rational** -2, ¾, 2.5, 3.33333
    - **Terminating Decimal** 3.5, ¾, 2, -1
    - **Repeating Decimal** -2/3, 1/3
  - **Irrational** $\pi, \sqrt{11}, e, 2.1710...$
- **Integers** …,-1,0,1,…
- **Whole** 0,1,2,3…
- **Natural or Counting** 1,2,3,4…

7. Which of the following is NOT a subset of {1,3,5,6,7,8,9,12}?

A) {1,3,8}
B) {1,4,6,7,8}
C) {12}
D) {1,3,5,6,7,8,12}

8. Which of the following is NOT a subset of all the even integers?

A) {2,4,8}
B) {4,10,12,16,18}
C) {2,8,9,12,18}
D) {100,102,1008,2012}

True or False

9. {3,4,8} $\subset$ {1,2,3,4,5,6}

10. {1,3,5,7} is a subset of all positive integers

11. The counting numbers is a subset of the whole numbers.

12. The set of all whole numbers is a subset of the natural numbers.

13. {-2,0,1,3,8}$\subset$ of all whole numbers

For each of the following questions, graph the sets on the number line to the right and, if A $\not\subset$ B, state one value of A that is NOT found in B. Place either $\subset$ or $\not\subset$ in the blank.

Sets	Graph	Element of A not in B (if applicable)
14. A = {x I x < 8} B = {x I x < 12} A____B		
15. A = {x I -2≤x<5} B = {x I x > 3} A____B		
16. A = {x I 2 < x < 5} B = {x I x > 1} A____B		
17. A = {x I 3<x<5} B = {x I -1 ≤x<10} A____B