

Set Operation Lab

Practice set rules, real choices, and ordered pairs.

HIGH SCHOOL • MA.912.LT.5.4

MA.912.LT.5.4 "Perform the set operations of taking the complement of a set and the union, intersection, difference and product of two sets."

NAME _____

DATE _____

SET OPERATION RULES

The complement A' contains the elements in the universal set U that are not in A . The union contains elements in either set, the intersection contains elements in both sets, and $A-B$ contains elements in A but not B . The product $A \times B$ is a set of ordered pairs, with the first element from A and the second element from B .

WORKED EXAMPLE

Let $U=\{p,q,r,s,t\}$, $C=\{p,r\}$, and $D=\{r,s\}$. Find C' , $C \cap D$, and $C \times D$.

1. Remove C from U : $C'=\{q,s,t\}$.
2. Keep the elements shared by C and D :
 $C \cap D=\{r\}$.
3. Pair each element of C with each element of D : $C \times D=\{(p,r),(p,s),(r,r),(r,s)\}$.

Answer: $C'=\{q,s,t\}$; $C \cap D=\{r\}$; $C \times D=\{(p,r),(p,s),(r,r),(r,s)\}$

PRACTICE 6 problems

- 1** Let $U=\{1,2,3,4,5,6,7,8\}$ and $J=\{2,4,7\}$. Find J' .

ANSWER _____

- 2** Let $A=\{1,4,6\}$ and $B=\{2,4,5\}$. Find $A \cup B$.

ANSWER _____

- 3** Let $H=\{0,2,5,7\}$ and $K=\{2,3,5,9\}$. Find $H \cap K$.

ANSWER _____

- 4** Let $R=\{1,3,4,8\}$ and $S=\{3,6,8\}$. Find $R-S$.

ANSWER _____

- 5** Let $M=\{2,5\}$ and $N=\{a,b,c\}$. Find $M \times N$.

ANSWER _____

- 6** Let $U=\{1,2,3,4,5,6,7,8,9,10\}$, $P=\{1,2,4,7\}$, and $Q=\{2,3,7,8\}$. Find $(P \cup Q)'$.

ANSWER _____

APPLY IT Show your work

- 1** A school media club has 30 members. Twelve members edit videos, 15 members produce podcasts, and 5 members do both. How many members do neither activity?

WORK SPACE

ANSWER _____

- 2** Riley is choosing a game profile with one background from $A = \{\text{forest, city, space}\}$ and one badge color from $B = \{\text{red, blue}\}$. List $A \times B$ and state how many profiles are possible.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 4, 6, 9\}$, $B = \{2, 3, 4, 7\}$, and $C = \{1, 3, 5, 7, 8\}$. Find $(A - B) \times (B' \cap C)$.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Let $U=\{1,2,3,4,5,6,7,8\}$ and $J=\{2,4,7\}$. Find J' .	$\{1,3,5,6,8\}$
2	Let $A=\{1,4,6\}$ and $B=\{2,4,5\}$. Find A union B .	$\{1,2,4,5,6\}$
3	Let $H=\{0,2,5,7\}$ and $K=\{2,3,5,9\}$. Find H intersect K .	$\{2,5\}$
4	Let $R=\{1,3,4,8\}$ and $S=\{3,6,8\}$. Find $R-S$.	$\{1,4\}$
5	Let $M=\{2,5\}$ and $N=\{a,b,c\}$. Find $M \times N$.	$\{(2,a),(2,b),(2,c),(5,a),(5,b),(5,c)\}$
6	Let $U=\{1,2,3,4,5,6,7,8,9,10\}$, $P=\{1,2,4,7\}$, and $Q=\{2,3,7,8\}$. Find $(P \text{ union } Q)'$.	$\{5,6,9,10\}$

PART 2 • APPLY IT

- 8 students** The number in at least one group is $12+15-5=22$. The complement has $30-22=8$ students.
- $\{(\text{forest},\text{red}),(\text{forest},\text{blue}),(\text{city},\text{red}),(\text{city},\text{blue}),(\text{space},\text{red}),(\text{space},\text{blue})\}$; 6 profiles** Form an ordered pair with a background first and a badge color second. There are $3 \times 2=6$ possible pairs.

CHALLENGE

$\{(1,1),(1,5),(1,8),(6,1),(6,5),(6,8),(9,1),(9,5),(9,8)\}$

Accept set elements in any order. For products, require ordered pairs with the first entry from the first set and the second entry from the second set.