

Event Set Detective

Use sets to describe outcomes and event relationships.

HIGH SCHOOL • MA.912.DP.4.1

MA.912.DP.4.1 "Describe events as subsets of a sample space using characteristics, or categories, of the outcomes, or as unions, intersections or complements of other events."

NAME _____

DATE _____

BUILD THE EVENT

An event is any group of outcomes in the sample space. Use $A \cup B$ for outcomes in A or B, $A \cap B$ for outcomes in both, and A' for outcomes in S that are not in A. List each outcome only once.

WORKED EXAMPLE

Let $S = \{\text{oak, pine, maple, birch}\}$, $A = \{\text{oak, maple}\}$, and $B = \{\text{maple, birch}\}$. Find $A \cap B$.

1. An intersection contains outcomes that are in both sets.
2. maple is the only outcome listed in both A and B.

Answer: $A \cap B = \{\text{maple}\}$

PRACTICE 6 problems

- 1** Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$. Write the event E for selecting an outcome divisible by 4.

ANSWER _____

- 2** A music app can select one genre from $S = \{\text{drama, jazz, pop, rock, rap, classical}\}$. Write the event G for selecting jazz or rap.

ANSWER _____

- 3** Let $S = \{2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Let A be the even outcomes, and let B be the factors of 18. List $A \cap B$.

ANSWER _____

- 4** Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Let P be the prime outcomes, and let H be the outcomes greater than 7. List $P \cup H$.

ANSWER _____

- 5** Let $S = \{a, b, c, d, e, f, g\}$ and $V = \{a, e\}$. List V' .

ANSWER _____

- 6** Let $S = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{0, 2, 4, 6, 8\}$, and $B = \{0, 3, 6, 9\}$. List $A' \cup B$.

ANSWER _____

APPLY IT Show your work

- 1** At a concert fundraiser, one raffle ticket numbered 21 through 32 is selected. Let E be the event that the ticket number is even, and let F be the event that the ticket number is a multiple of 5. A ticket wins a meet-and-greet if it is in $E \cup F$. List the winning ticket numbers.

WORK SPACE

ANSWER _____

- 2** At a student film festival, one volunteer is selected from $S = \{\text{Avery, Blake, Cameron, Devon, Ellis, Finley, Gray, Harper}\}$. Let $M = \{\text{Avery, Cameron, Ellis, Harper}\}$ be the music crew, and let $V = \{\text{Blake, Cameron, Devon, Harper}\}$ be the video crew. Describe the event that the volunteer is on neither crew, then list its outcomes.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Let $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$. Let A be the multiples of 2, B be the multiples of 3, and C be the multiples of 5. An outcome must be in exactly one of A and B , and it cannot be in C . Write an expression for this event and list its outcomes.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Let $S=\{1,2,3,4,5,6,7,8,9,10,11,12\}$. Write the event E for selecting an outcome divisible by 4.	$E=\{4,8,12\}$
2	A music app can select one genre from $S=\{\text{drama, jazz, pop, rock, rap, classical}\}$. Write the event G for selecting jazz or rap.	$G=\{\text{jazz, rap}\}$
3	Let $S=\{2,3,4,5,6,7,8,9,10\}$. Let A be the even outcomes, and let B be the factors of 18. List $A \cap B$.	$A \cap B=\{2,6\}$
4	Let $S=\{1,2,3,4,5,6,7,8,9,10\}$. Let P be the prime outcomes, and let H be the outcomes greater than 7. List $P \cup H$.	$P \cup H=\{2,3,5,7,8,9,10\}$
5	Let $S=\{a,b,c,d,e,f,g\}$ and $V=\{a,e\}$. List V' .	$V'=\{b,c,d,f,g\}$
6	Let $S=\{0,1,2,3,4,5,6,7,8,9\}$, $A=\{0,2,4,6,8\}$, and $B=\{0,3,6,9\}$. List $A' \cup B$.	$A' \cup B=\{0,1,3,5,6,7,9\}$

PART 2 • APPLY IT

1. **$E \cup F=\{22,24,25,26,28,30,32\}$** List the even ticket numbers and the multiples of 5. Combine the lists, writing 30 only once.
2. **$(M \cup V)'=\{\text{Finley, Gray}\}$** First find everyone in $M \cup V$. The volunteers left in S are Finley and Gray.

CHALLENGE

$$(A \cap B' \cap C') \cup (A' \cap B \cap C) = \{2,3,4,8,9,14,16\}$$

Accept equivalent set notation and outcomes in any order. For the challenge, accept any equivalent expression that selects outcomes in exactly one of A and B and excludes C.