

## Finding Probability of the Union and Intersection of Events

Union of Sets	$A \cup B$	Intersection of Sets	$A \cap B$
The union of two sets consists of all the elements of both sets. $A \cup B$ is all of the elements that are contained within set $A$ <b>OR</b> set $B$ .		The intersection of two sets consists of the elements that are common to both sets. $A \cap B$ is all the elements that are contained within both set $A$ <b>AND</b> set $B$ .	

### Example

A survey of students' preferences for spring sports produced the following results:

	Baseball	Lacrosse	Total
Blue	14	16	30
Orange	12	18	30
Total	26	34	60

- What is the probability a student is in the orange group?

**Answer:** The total number of students in the orange group is 30. The total number of students is 60. Therefore, the probability  $P(\text{orange}) = \frac{30}{60} = \frac{1}{2} = 0.5 = 50\%$

- What is the probability a student prefers baseball?

**Answer:** The total number of students that preferred baseball is 26. The total number of students is 60.  $P(\text{baseball}) = \frac{26}{60} = \frac{13}{30} \approx 0.433 \approx 43.3\%$

- What is the probability a student is in the orange group and prefers baseball?

**Answer:** The intersection of baseball and the orange group is 12.

$$P(\text{baseball} \cap \text{orange}) = \frac{12}{60} = \frac{1}{5} = 0.2 = 20\%$$

- What is the probability a student is in the orange group or prefers baseball?

**Answer:** The total number of students who preferred baseball is 26, 14 from the blue group and 12 from the orange group. There are 19 more students in the orange group that we need to include. So the total students in the orange group or preferred baseball is  $26 + 19 = 45$ .

$$P(\text{orange} \cup \text{baseball}) = \frac{45}{60} = \frac{3}{4} = 0.75 = 75\%$$

### Try These

Using the table above answer the following.

- What is the probability a student was in the blue group and preferred lacrosse?
- What is the probability a student was in the blue group or preferred baseball?
- What is the probability a student preferred lacrosse and was in the orange group?

## Try These

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1. A standard deck of 52 playing cards has 4 suits with 13 different cards in each suit.





















































a. Find the probability of drawing a king or a queen.

b. Find the probability of drawing a spade and an ace.

c. Find the probability of drawing a card that is a K, Q or J.

d. Find the probability of drawing a card that is red and a king.

### Standard 52-card deck

K 	K 	K 	K 
Q 	Q 	Q 	Q 
J 	J 	J 	J 
10 	10 	10 	10 
9 	9 	9 	9 
8 	8 	8 	8 
7 	7 	7 	7 
6 	6 	6 	6 
5 	5 	5 	5 
4 	4 	4 	4 
3 	3 	3 	3 
2 	2 	2 	2 
A 	A 	A 	A 

2. A bag of skittles contains 19 cherry, 23 orange, 22 grape, 11 lemon and 25 lime pieces of candy.

a. Find the probability of selecting a lime or grape skittle.

b. Find the probability of selecting a cherry skittle.

c. Find the probability of selecting an orange or grape.

d. Find the probability of selecting a skittle that is not lemon.