1.1 Sample Spaces and Subsets

Students will be able to (SWBAT) describe events as subsets of sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events. (S-CP.1)

Sample Space

▶ **Sample Space:** The **set** of all possible outcomes of an experiment.

▶ List the sample space, S, for each of the following:

   1. Tossing a coin

      ▶ S = {H,T}

   2. Rolling a six-sided die

      ▶ S = {1,2,3,4,5,6}

   3. Drawing a marble from a bag that contains two red, three blue and one white marble

      ▶ S = {r, r, b, b, b, w}

Intersections and Unions of Sets

- **Intersection of two sets (A $\cap$ B)**: the set of all elements in both set A **AND** set B.

- Example 4. Given the following sets, find A $\cap$ B

  A = {1,3,5,7,9,11,13,15}   B = {0,3,6,9,12,15}

  A $\cap$ B = {3,9,15}

- **Union of two sets (A $\cup$ B):** the set of all elements in set A **OR** set B or Both.

- Example 5: Given the following sets, find A $\cup$ B

  A = {1,3,5,7,9,11,13,15}   B = {0,3,6,9,12,15}

 A $\cup$ B = {0,1,3,5,6,7,9,11,12,13,15}

Venn Diagrams

- ▶ Sometimes drawing a diagram helps in finding intersections and unions of sets.

- ▶ A **Venn Diagram** is a visual representation of sets and their relationships to each other using overlapping circles. Each circle represents a different set.

A
Different

Similar

B
Different
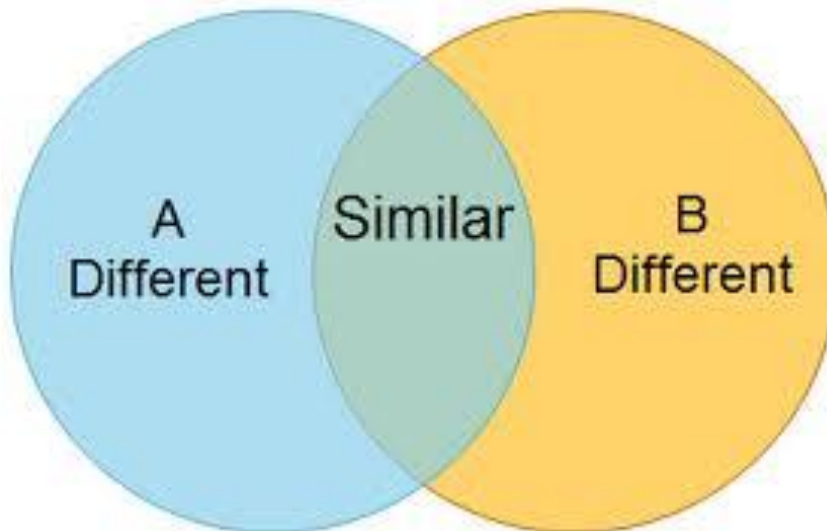
Use the Venn Diagram to answer the questions below:

Factors of 12

Factors of 16

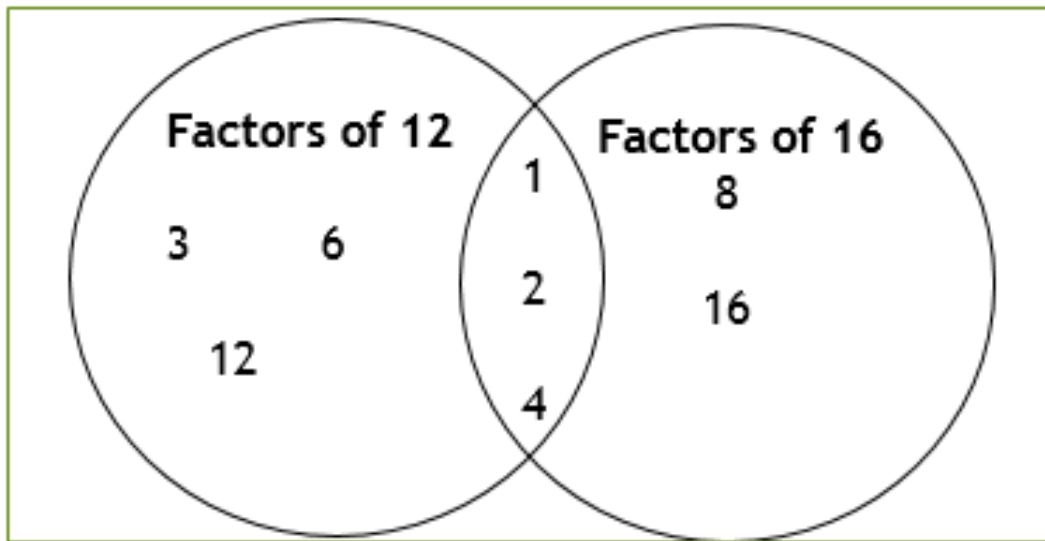3   6

12

1

2

4

8

16
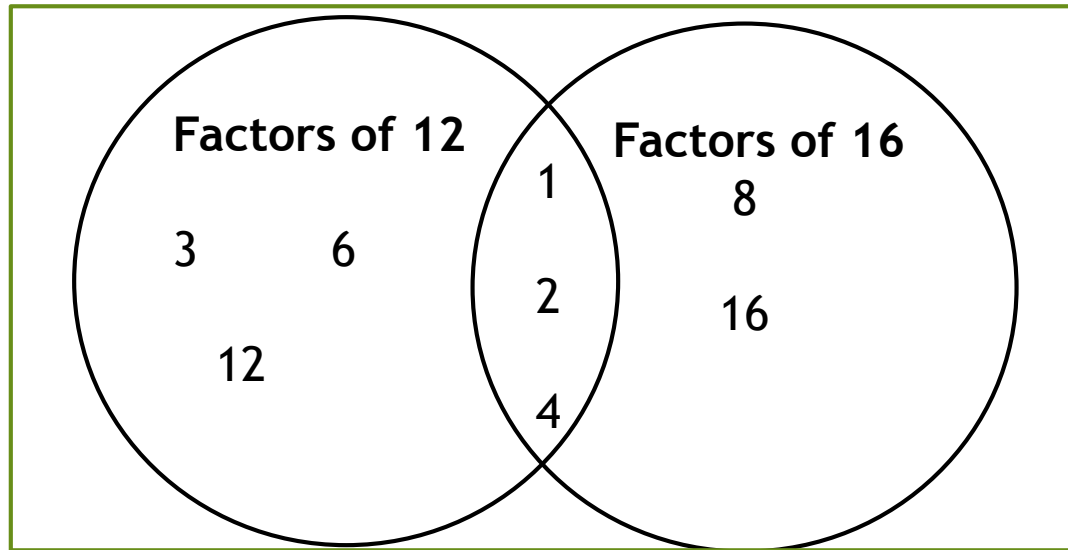
6. What are the elements of set A?

{1,2,3,4,6,12}

7. What are the elements of set B?

{1,2,4,8,16}

8. Why are 1, 2, and 4 in both sets?

-They're factors of both 12 **AND** 16

Factors of 12 · Factors of 16

3   6

12

1

2

4

8

16

9.   What is A ∩ B?

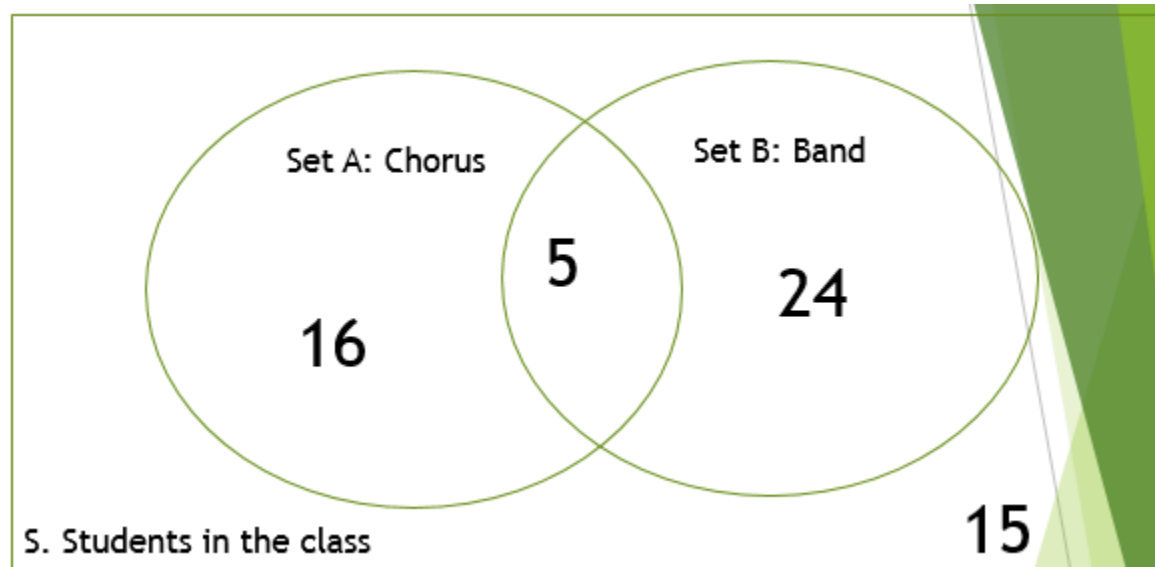{1,2,4}
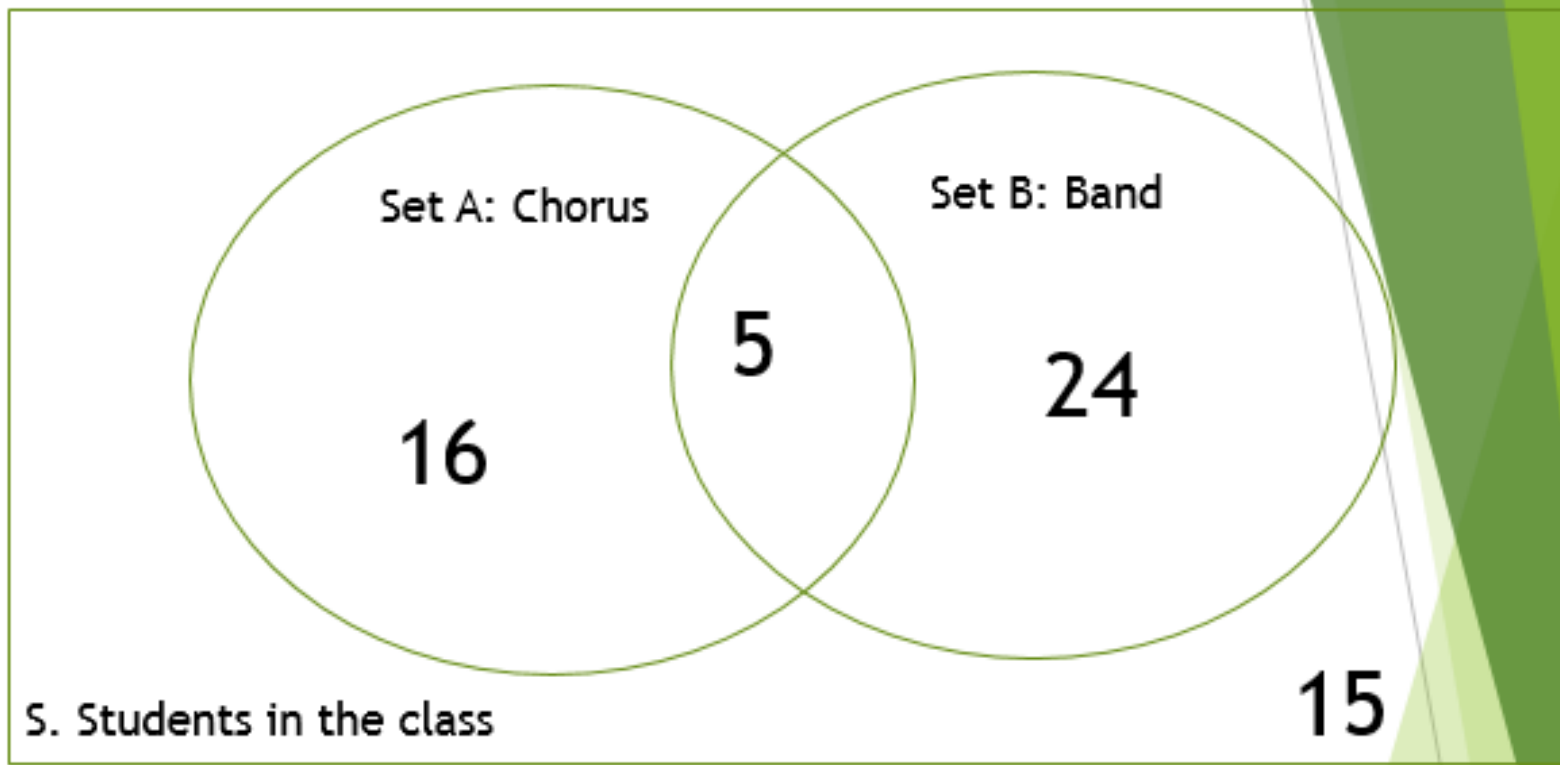
10. What is A ∪ B?

{1,2,3,4,6,8,12,16}

In a class of 60 students, 21 sign up for chorus, 29 sign up for band, and 5 take both. 15 students in the class are not enrolled in either band or chorus.

11. Put this information into a Venn Diagram. If the sample space, S, is the set of all students in the class, let students in chorus be set A and students in band be set B.

Set A: Chorus   Set B: Band

5

24

16

S. Students in the class   15

Set A: Chorus

Set B: Band

5

16

24

S. Students in the class

15

12. A ∪ B = {45}

13. A ∩ B = {5}

Complement of a set

▶ The **complement** of a set is the set of all elements **NOT** in the set.

▶ Ex: S = {...-3,-2,-1,0,1,2,3,4,...}

   A = {...-2,0,2,4,...}

14. If A is a subset of S, what is A^C?

A^C = {..-3,-1,1,3,5,...}

All the odd numbers

A. Students in Chorus

B. Students in Band

5

24

16

S. Students in the class

15
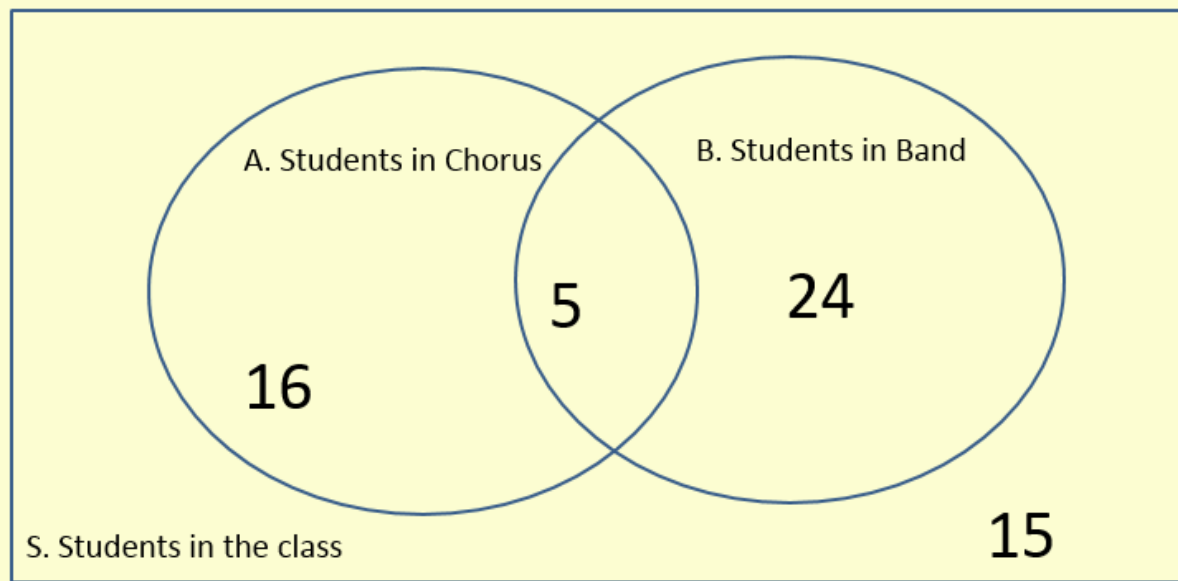
15. What is A^C?

$A^C = \{24 + 15\}$

$A^C = \{39\}$

16. What is B^C?

$B^C = \{16 + 15\}$

$B^C = \{31\}$

17. What is $(A \cap B)^C$?

$(A \cap B)^C = \{16+15+24\}$

$(A \cap B)^C = \{55\}$

18. What is $(A \cup B)^C$?

$(A \cup B)^C = \{15\}$