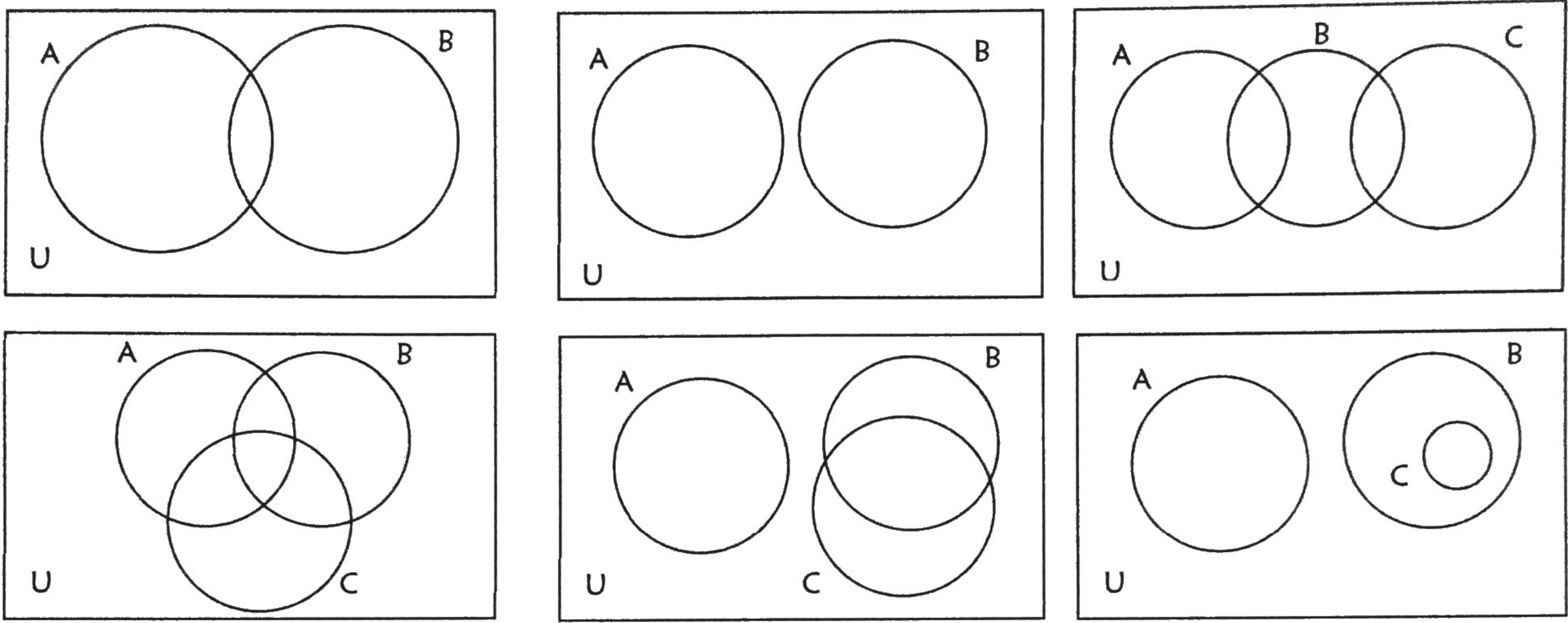


8A Venn Diagrams

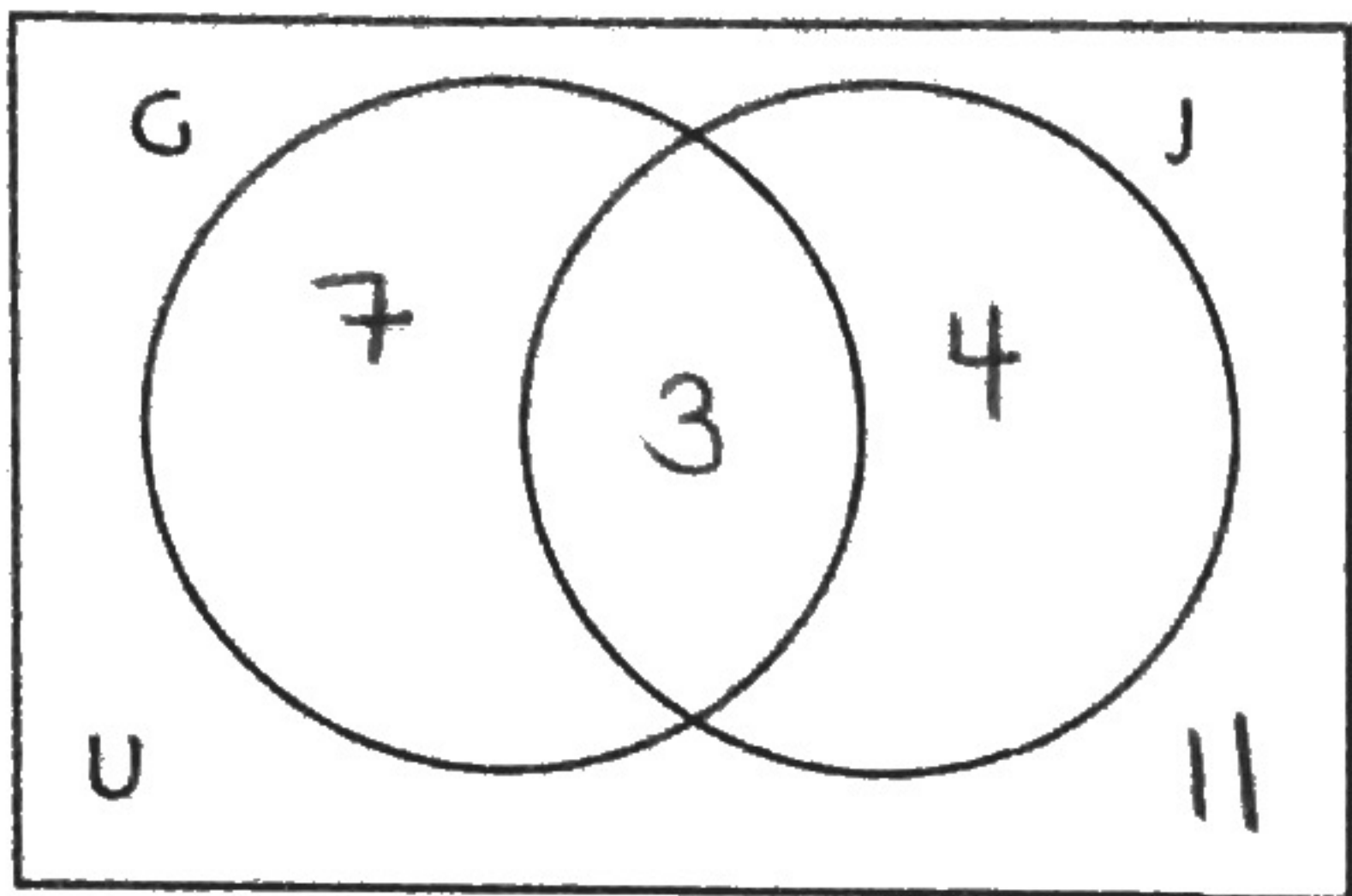
Venn Diagrams are a way organize various properties of members of a group.



Some symbols we will use and explore.

Symbol	Name	Meaning	Example
U	universal set	The set of all possible members being surveyed for properties	$U = \{\text{all the people in room 4 during our Precalculus class}\}$
A, B, C	Sets	A group in U that has a particular property	$M = \{\text{all males}\}$ $S = \{\text{seniors}\}$ $T = \{\text{teachers}\}$
$A \cap B$	intersection	belong to sets A <u>AND</u> B	$M \cap S = \{\text{anyone who is a male AND a senior}\}$
$A \cup B$	union	belong to sets A <u>OR</u> B	$M \cup S = \{\text{anyone who is a male OR a senior}\}$
$A \subseteq B$	subset	A is a subset of B ; A is a more specific group of B , but they could be equal.	If $B = \{\text{males who are teen boys}\}$, then $B \subseteq M$ <i>Out of all the males in the room, a smaller or equal portion are also teenagers</i>
$A \subset B$	proper subset	A is a proper subset of B ; A is a more specific group of B and has fewer members.	If $G = \{\text{females who are teen girls}\}$ then $G \subset F$ <i>Out of all the females in the room, a smaller portion are teenagers; the teacher is an adult</i>
$A \not\subseteq B$	not a subset	left set not a subset of right set	$G \not\subseteq M$
\bar{A} A' A^c	Not A ; A 's complement	everything that is NOT in set A	If $A = \{\text{all students who have a 90% or higher}\}$ Then $\bar{A} = \{\text{all students with an 89% or lower}\}$
\emptyset	empty set	No members of this set	If $J = \{\text{people in the room who are from Jupiter}\}$ $T = \emptyset$

$A \cap B$ – the Intersection



* When filling in, ALWAYS start with the intersections

Shade: Overlapping Region

If you see $A \cap B$, then whatever you are shading HAS to be contained inside some portion of A or B

Example: There are 25 people in a class.

10 are girls, 7 people wearing jeans, and 3 girls are wearing jeans.

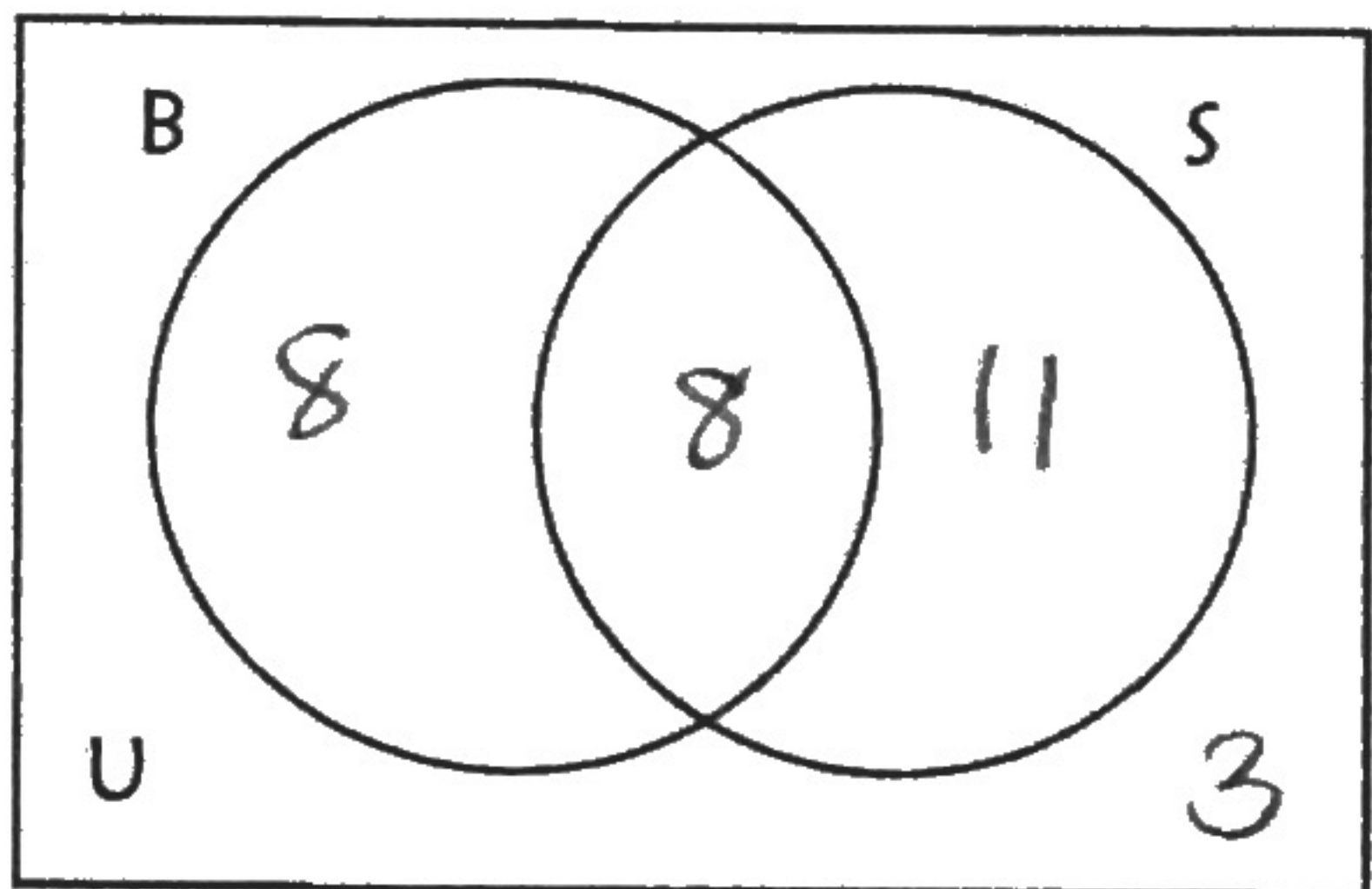
Name the set and how many are in it:

a. Girls who are wearing jeans: $\boxed{3, G \cap J}$

b. Boys: $\boxed{15, \bar{G}}$

c. Boys who are wearing jeans $\boxed{\bar{G} \cap J, 4}$

$A \cup B$ – the Union



Shade: Every set in the union

If you see $A \cup B$, then you will be shading more than one set

Example: There are ~~27~~^{30 (sorry!)} people in a class.

16 have brothers, 19 have sisters, and 8 have both

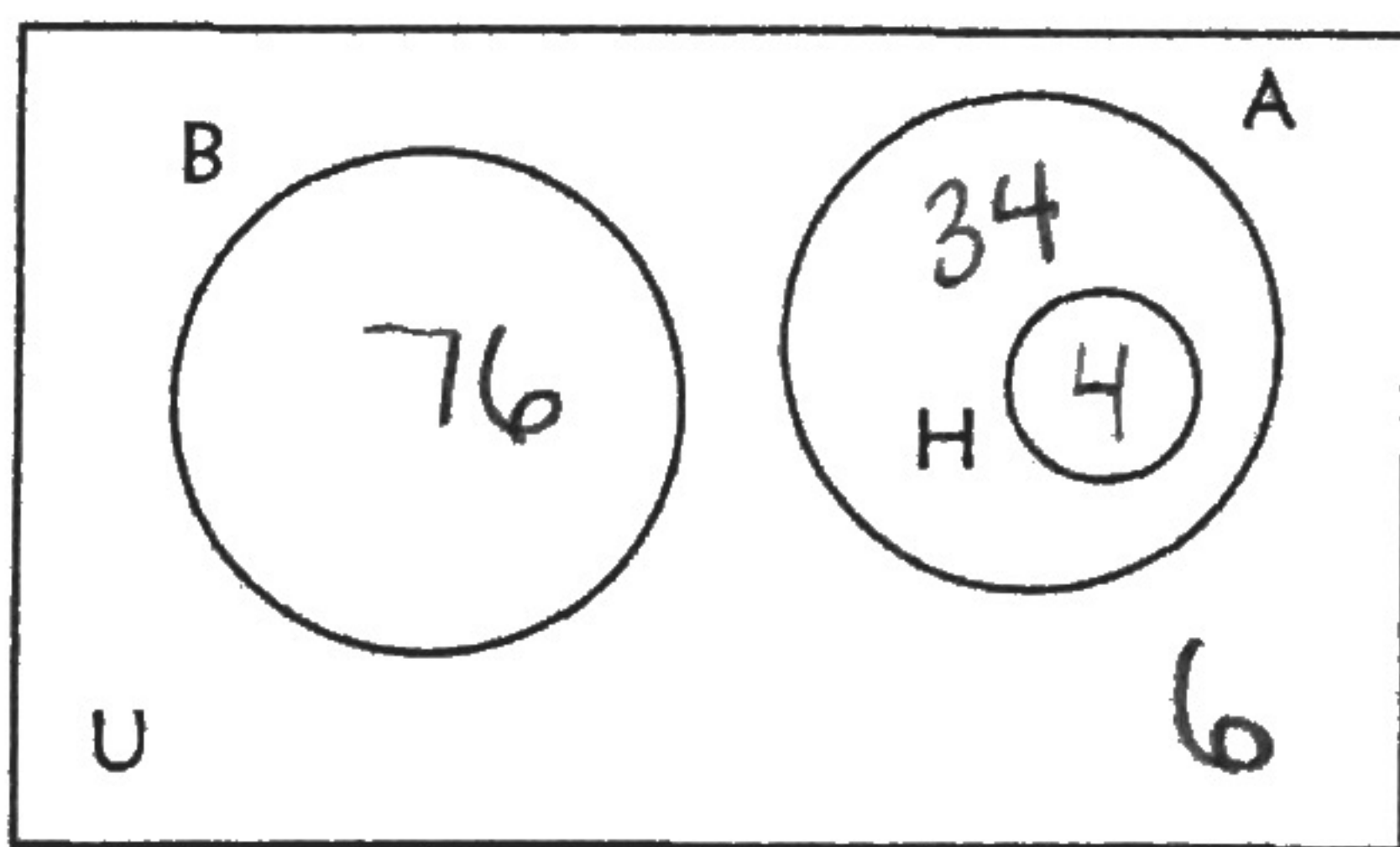
Name the set and how many are in it:

a. Students who have a brother or a sister $\boxed{27; B \cup S}$

b. Students who have both $\boxed{8, B \cap S}$

c. Students who have a sister, but not a brother $\boxed{11; S \cap \bar{B}}$

Example: Grades in a class: 120 students taking a class, 114 are passing. 38 have a 90% or above, 4 have a 100%.



Name the set and how many are in it:

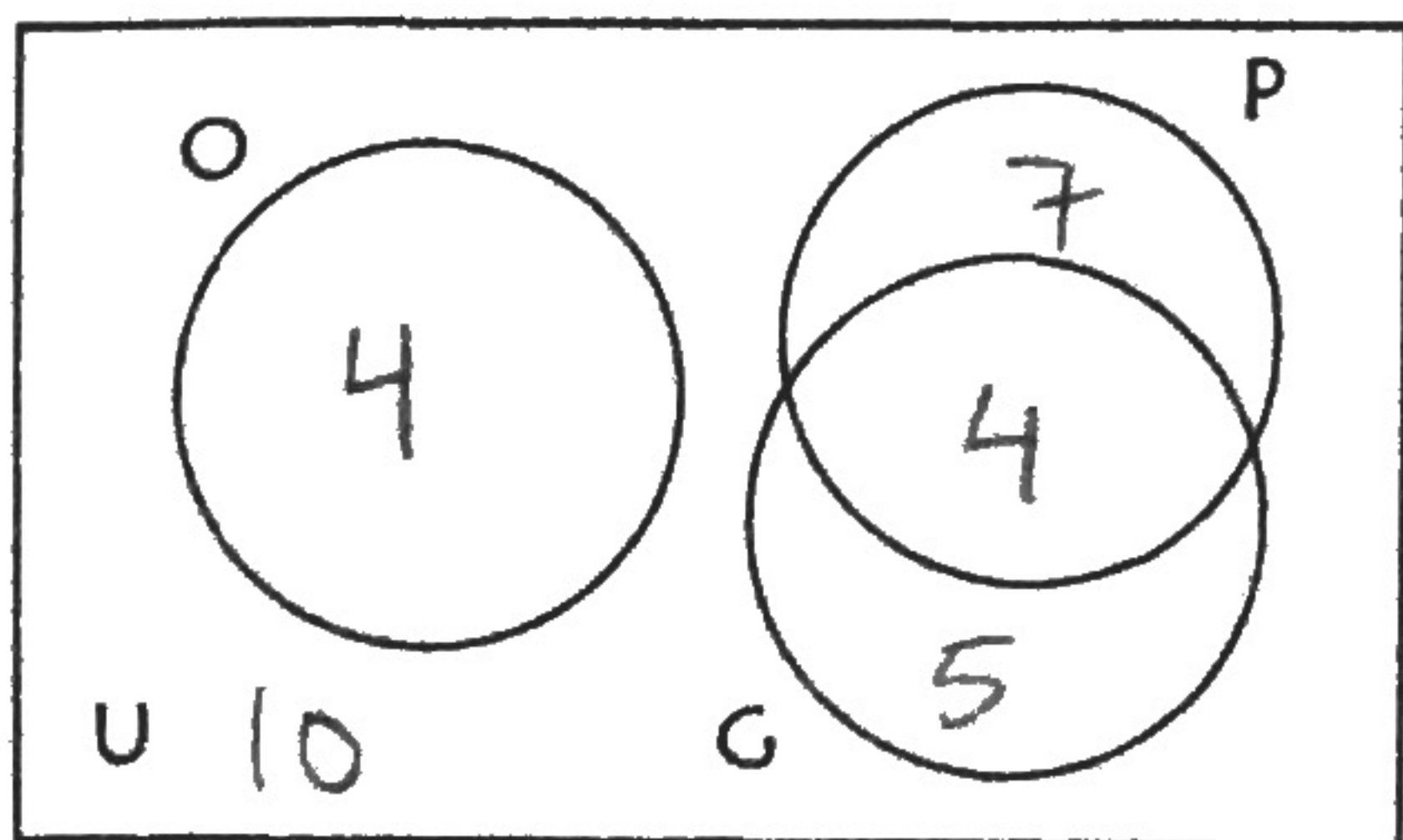
a. Students who have an A, but not a 100% $\boxed{34, A \cap \bar{H}}$

b. Students who are passing $\boxed{114; B \cup A \cup H}$

c. Students who are passing, but not with an A $\boxed{76, B}$

d. Students who are failing $\boxed{6, \bar{B} \cup \bar{A} \cup \bar{H}}$

Example: Musicality: In a class of 30, 20 students play an instrument, 11 play piano, 9 play guitar, 4 play both.



a. Students who only play guitar: $\boxed{5, G \cap \bar{P}}$

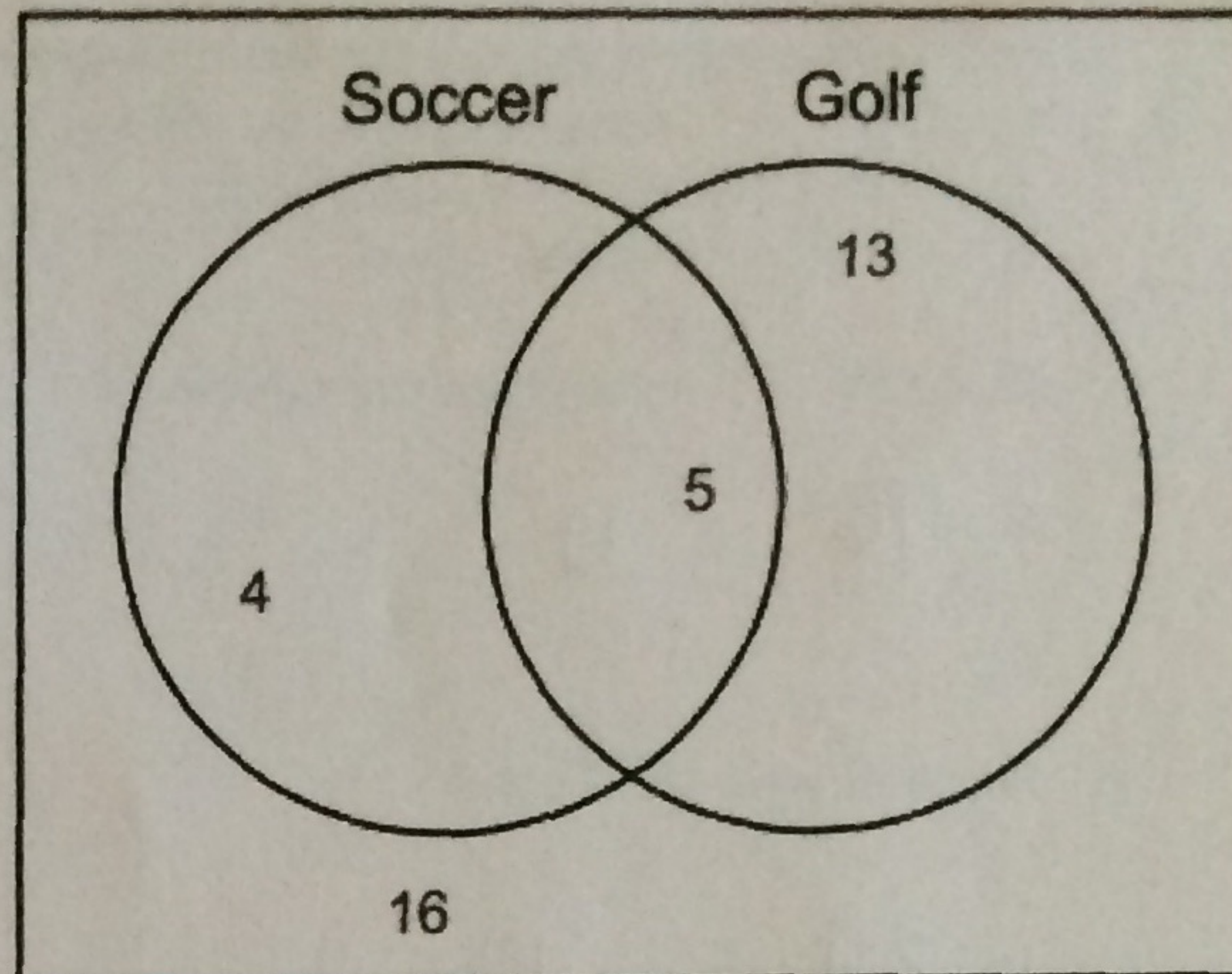
b. Students who play piano or something else. $\boxed{15; P \cup \bar{O}}$

c. Students who do not play an instrument $\boxed{10; \bar{O} \cup \bar{P} \cup \bar{G}}$

d. Students who play guitar only or nothing. $\boxed{15; (G \cap \bar{P}) \cup \bar{G}}$

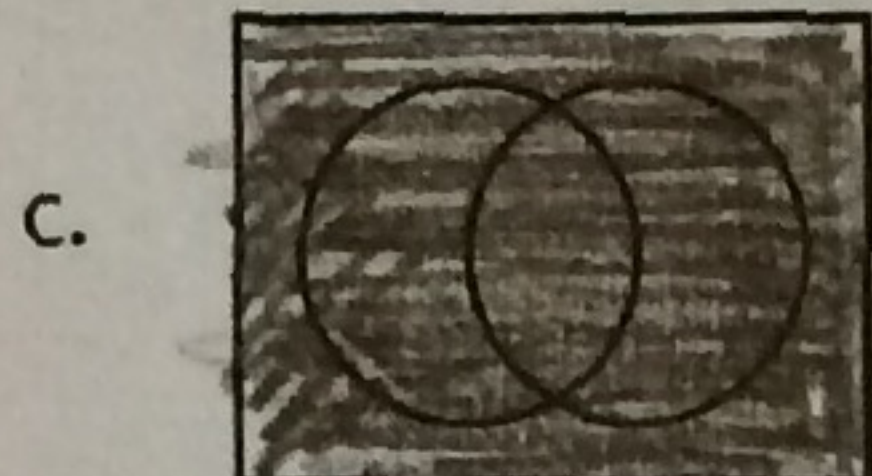
For each of the following, use the Venn Diagram to:

- State how many elements are in the stated set or subset
- Name the set using Set Symbols
- Shade the Venn diagram.



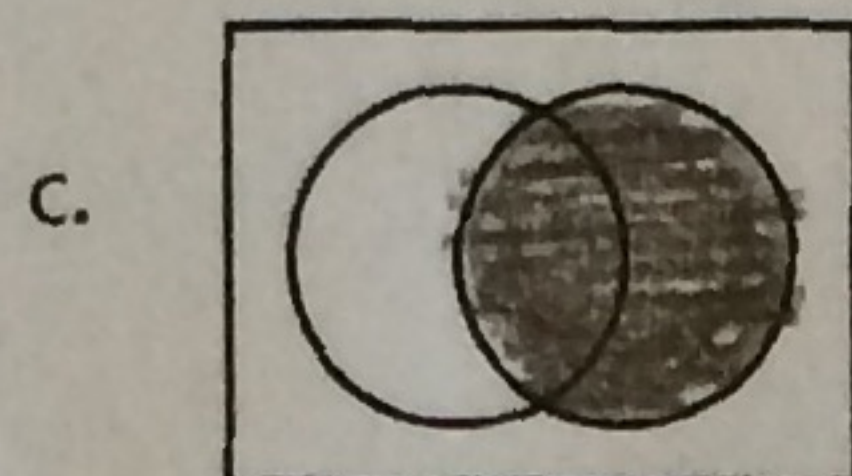
1. Students who were given the survey

a. 38 b. U



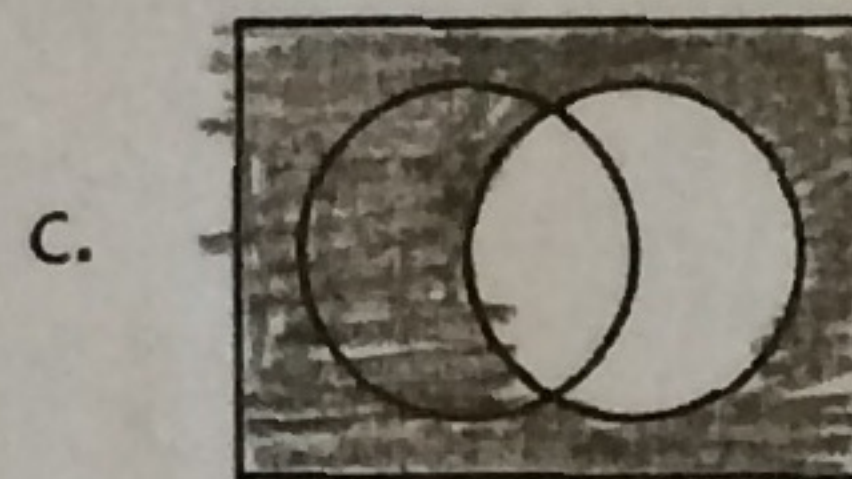
2. Students who like Golf

a. 18 b. G



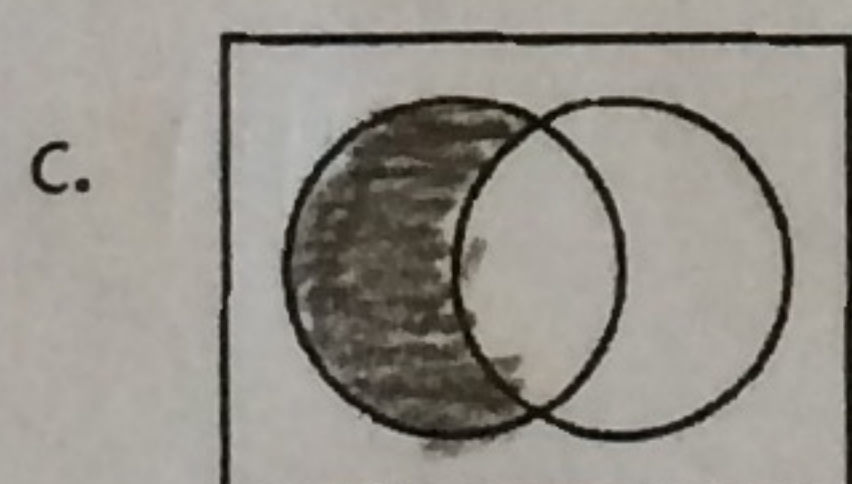
3. Students who do not like Golf

a. 20 b. \bar{G}



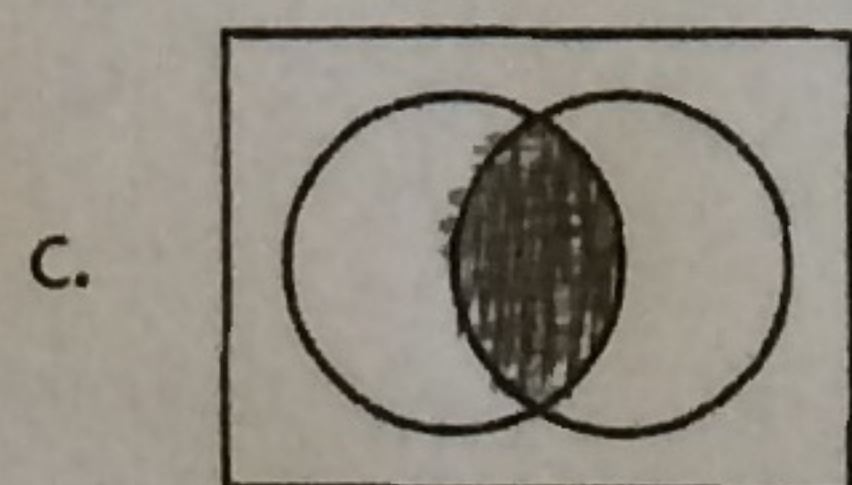
4. Students who like Soccer, but not Golf

a. 4 b. $S \cap \bar{G}$



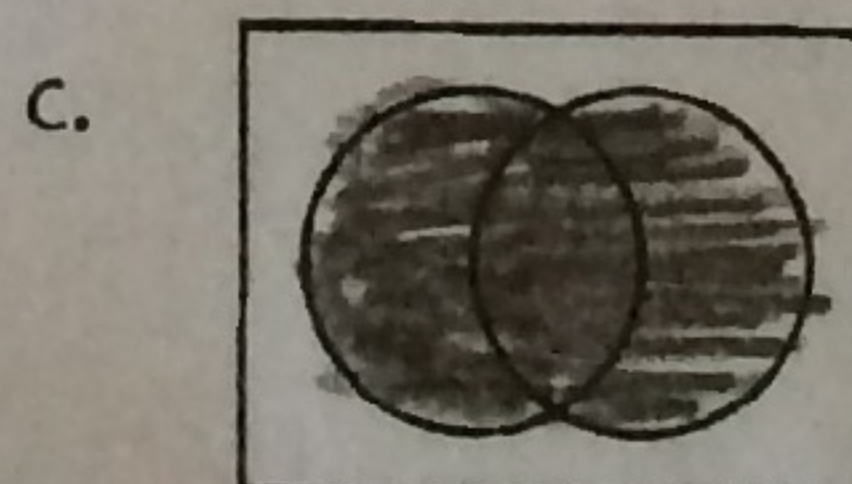
5. Students who like Soccer and Golf

a. 5 b. $S \cap G$



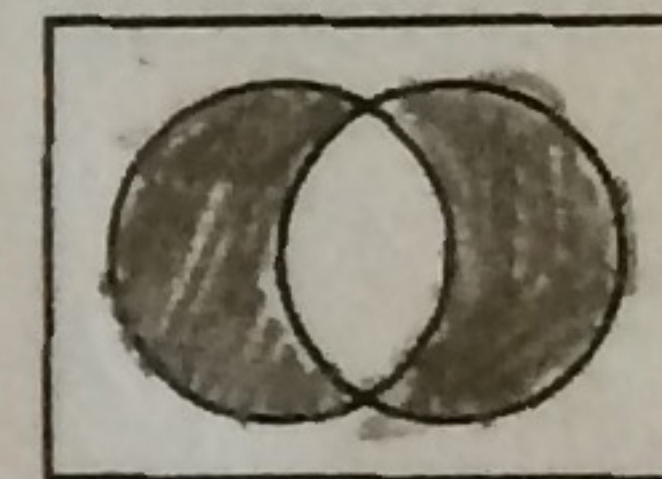
6. Students who like Soccer or Golf

a. 22 b. $S \cup G$



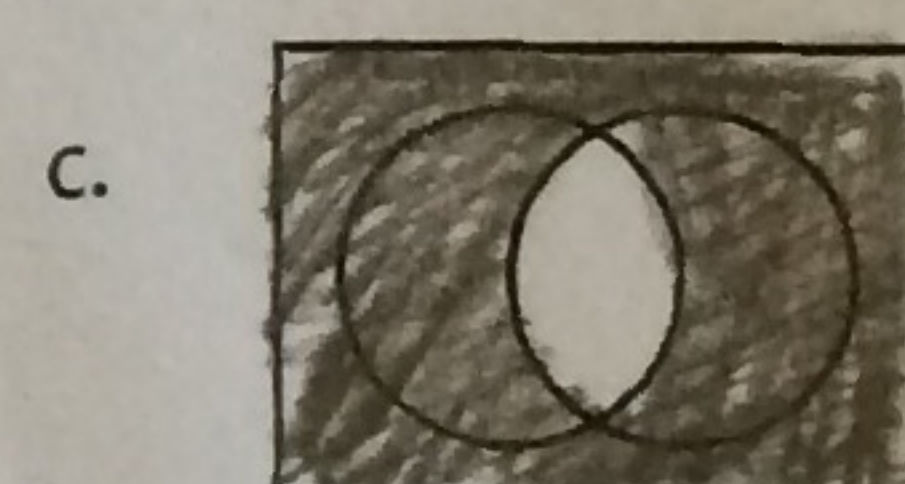
7. Students who only like one of the two sports

a. 17 b. $(S \cap \bar{G}) \cup (\bar{S} \cap G)$
or
 $(S \cap \bar{G}) \cup (G \cap \bar{S})$



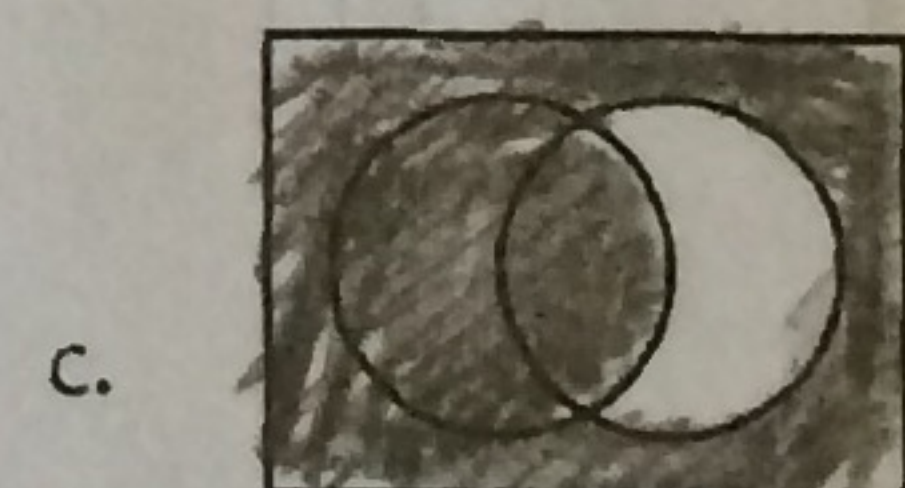
8. Students who do not like both sports

a. 33 b. $\overline{S \cap G}$



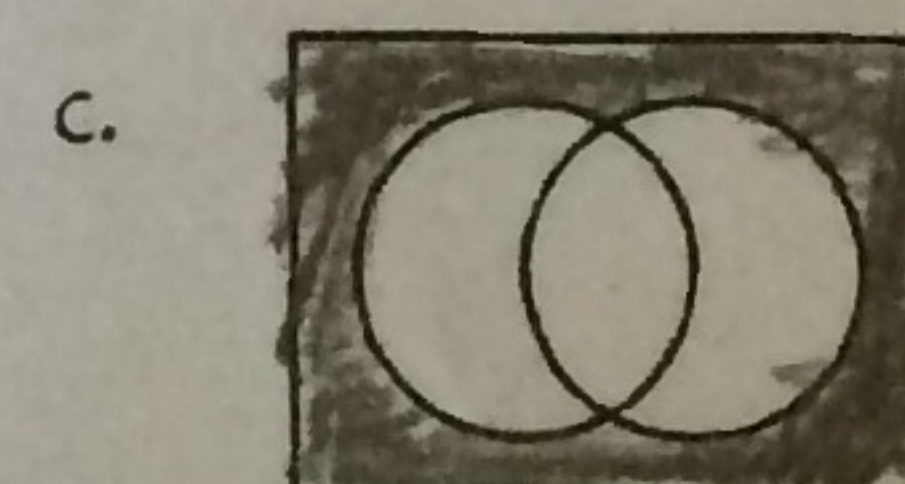
9. Students who like Soccer or don't like Golf

a. 25 b. $S \cup \bar{G}$



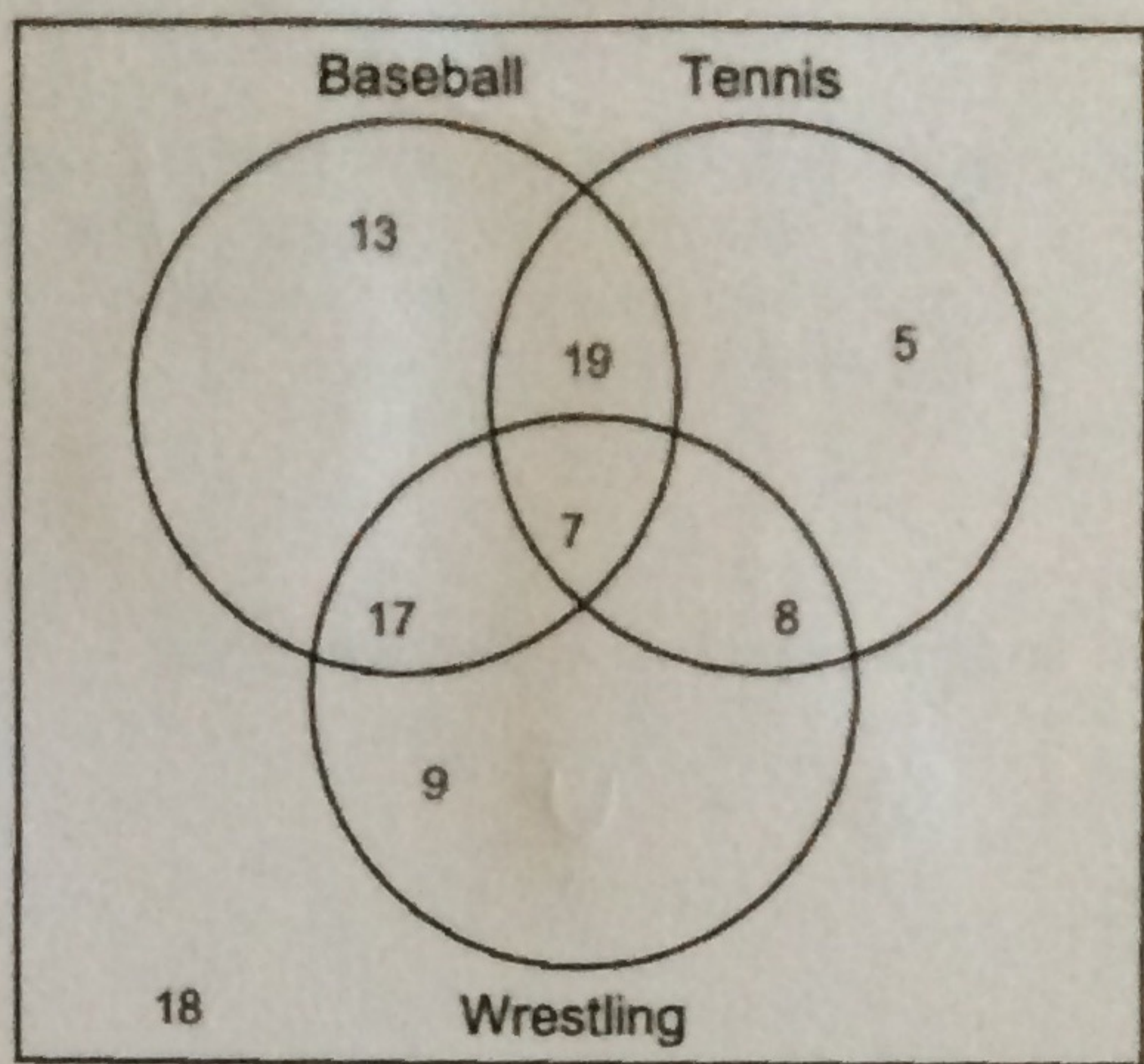
10. Students who do not like Soccer or Golf

a. 16 b. $\overline{S \cup G}$



For each of the following, use the Venn Diagram to:

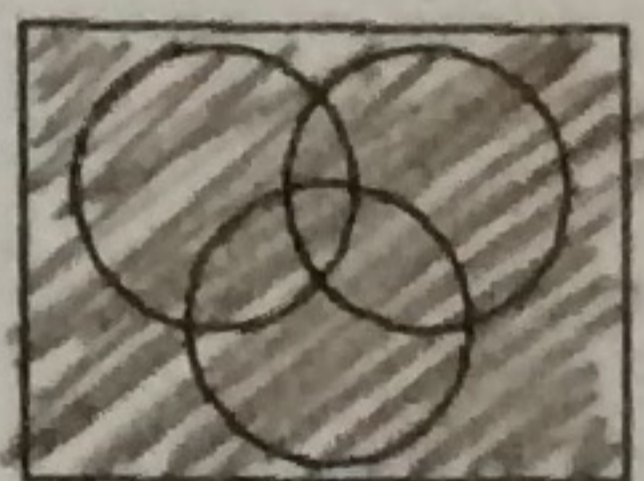
- State how many elements are in the stated set or subset
- Name the set using Set Symbols
- Shade the Venn diagram.



1. Students who were given the survey

a. 96 b. U

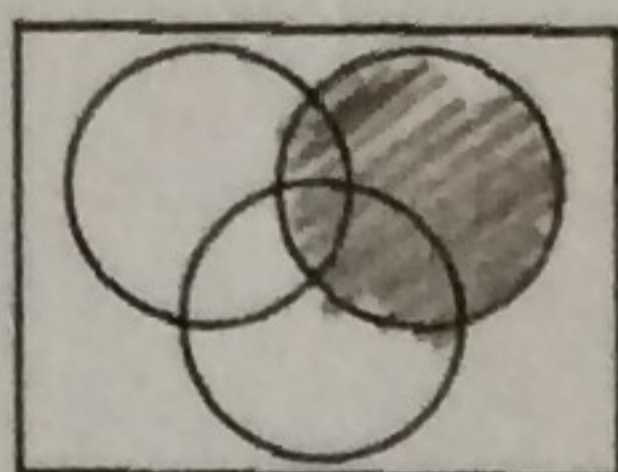
c.



2. Students who like Tennis

b. 39 b. T

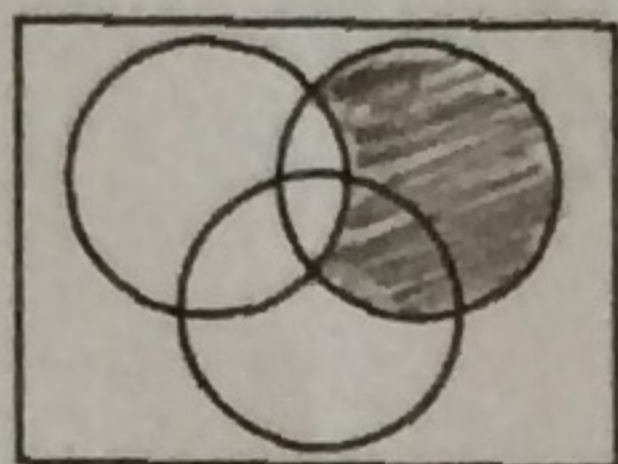
c.



3. Students who like Tennis, but not Baseball

b. 13 b. $T \cap \bar{B}$

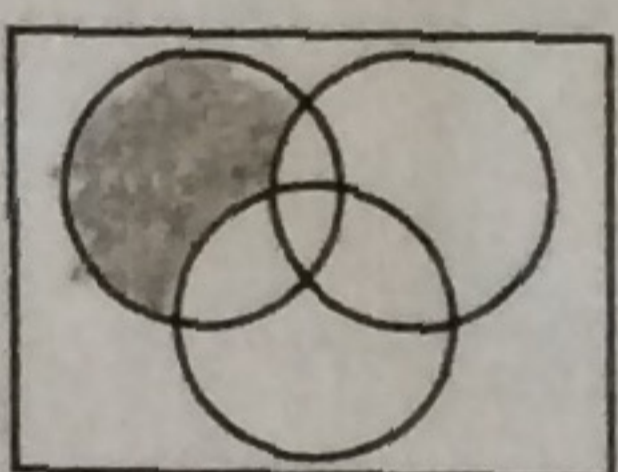
c.



4. Students who ONLY like Baseball

b. 13 b. $B \cap (\overline{T \cup W})$

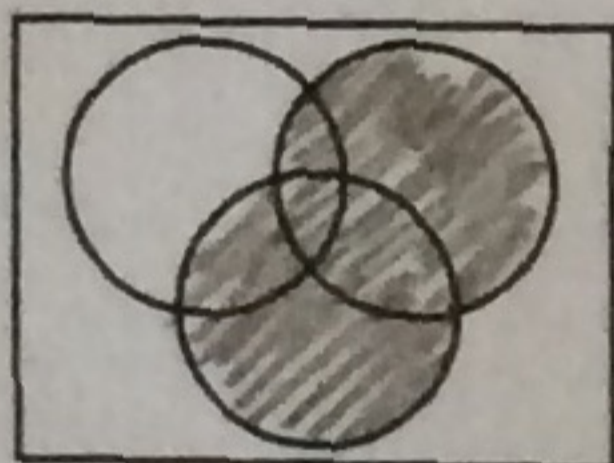
c.



5. Students who like Tennis or Wrestling.

c. 65 b. $T \cup W$

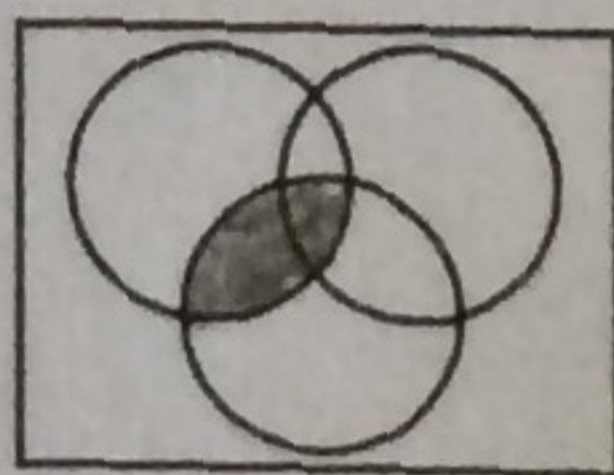
c.



6. Students who like Baseball and Wrestling.

d. 24 b. $B \cap W$

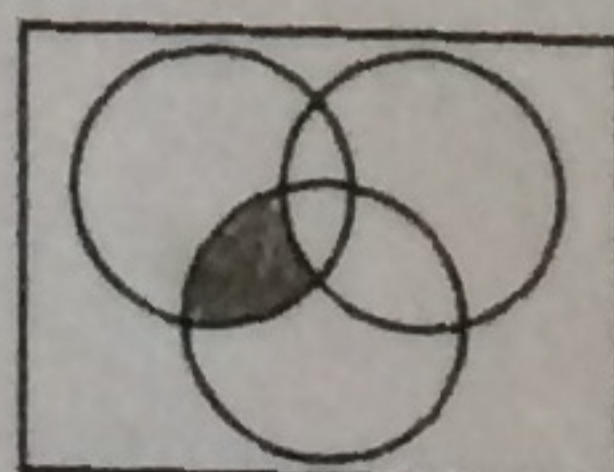
c.



7. Students who like Baseball and Wrestling, but not Tennis

c. 17 b. $(B \cap W) \cap \bar{T}$

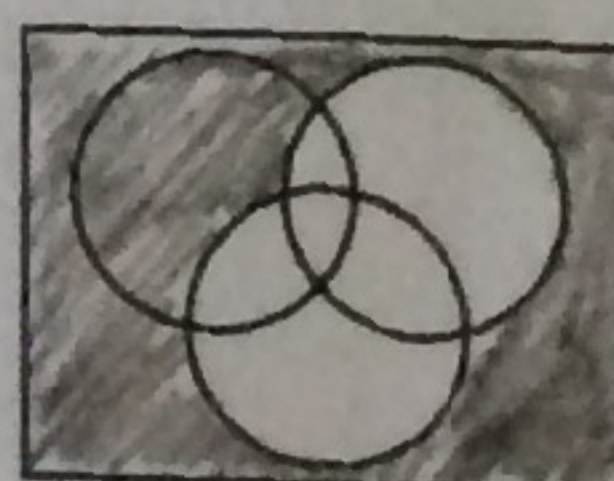
c.



8. Students who do not like Tennis or Wrestling

d. 31 b. $\overline{T \cup W}$

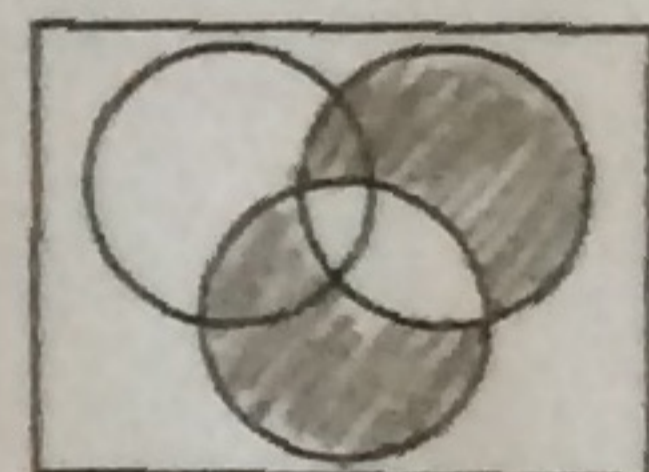
c.



9. Students who like Tennis or Wrestling, not both

a. 50 b. $(T \cup W) \cap (\overline{T \cap W})$

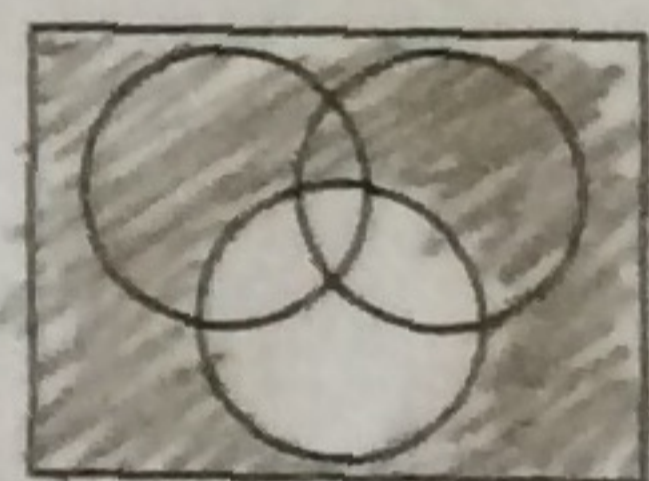
c.



10. Students who do not like Wrestling

a. 55 b. \bar{W}

c.

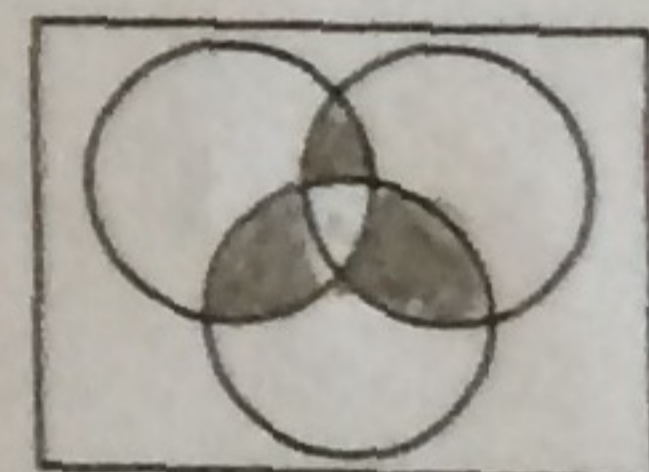


Tricky!

11. Students who like two sports

a. 44 b. $(B \cap W \cap \bar{T}) \cup (W \cap T \cap \bar{B}) \cup (B \cap T \cap \bar{W})$

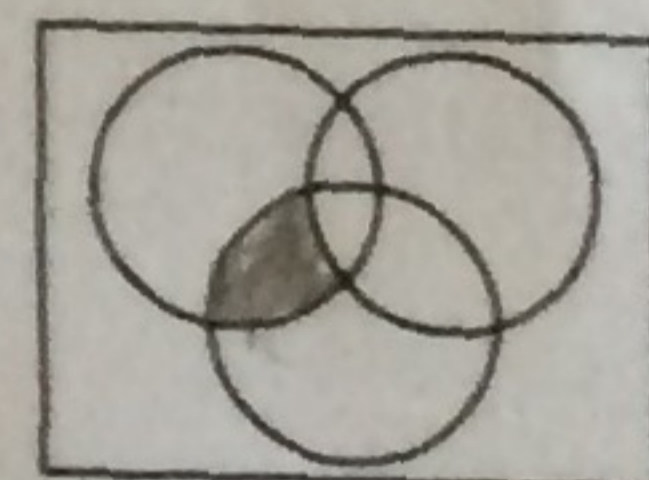
c.



12. Students who like two sports, but not Tennis.

a. 17 b. $(B \cap W) \cap \bar{T}$

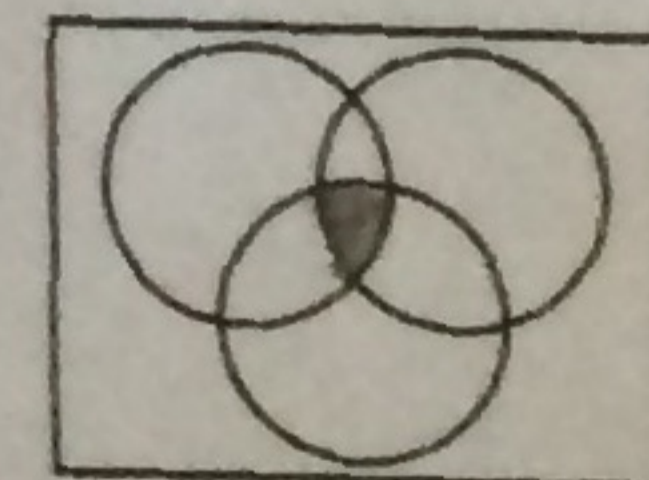
c.



13. Students who like all three sports

a. 7 b. $B \cap T \cap W$

c.



14. Students who don't like any of these sports.

a. 18 b. $\overline{B \cup T \cup W}$

c.

