In A Year Group Of 113 Student 60 Liked Hockey 45 Liked Rugby And 18 Liked Neither. Calculate The Number

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Understanding the distribution of students' preferences in sports within a school or year group is essential for various reasons, including planning sports activities, allocating resources, and fostering student engagement. In this article, we will analyze a scenario where a year group comprises 113 students, with specific numbers liking hockey, rugby, or neither. We will explore how to determine the number of students involved in each sport, including those who like both, and those who dislike both. This comprehensive guide will walk you through the calculations step by step, ensuring clarity and understanding, while also highlighting the importance of such data in educational planning.

Overview of the Problem

Let's revisit the problem statement:

- Total number of students in the year group: 113
- Number of students who liked Hockey: 60
- Number of students who liked Rugby: 45
- Number of students who liked Neither: 18

Our goal is to determine the number of students who liked only hockey, only rugby, both sports, and those who disliked both. Additionally, we will verify the consistency of these numbers and interpret what they tell us about students' preferences.

Understanding the Key Concepts

Before diving into calculations, it’s important to understand some fundamental concepts related to sets and their overlaps:

Sets and Subsets

- Set: A collection of distinct objects, in this case, students who like a particular sport.
- Subset: A set contained within another set, for example, students who like both hockey and rugby.

Union and Intersection

- Union ($A \cup B$): All students who like either hockey, rugby, or both.
- Intersection ($A \cap B$): Students who like both hockey and rugby.

Complement

- Students who like neither sport can be considered the complement of the union of students who like at least one sport.

Step-by-Step Calculation Approach

To accurately determine the distribution of preferences, we'll use set theory principles, especially the formula for the union of two sets:

$$
|A \cup B| = |A| + |B| - |A \cap B|
$$

Where:
- $|A|$ = number of students who like hockey
- $|B|$ = number of students who like rugby
- $|A \cap B|$ = number of students who like both sports

Now, let's proceed step by step:

Step 1: Identifying Known Values

- Total students, $T = 113$
- Liked Hockey, $H = 60$
- Liked Rugby, $R = 45$
- Liked Neither, $N_{neither} = 18$

Step 2: Determine the number of students who liked at least one sport

Since 18 students liked neither, the number of students who liked at least one sport is:

$$
N_{at \, least \, one} = T - N_{neither} = 113 - 18 = 95
$$

Step 3: Use the union formula to find the intersection

We know:

$$
|H \cup R| = N_{at \, least \, one} = 95
$$

Applying the union formula:

$$
|H \cup R| = |H| + |R| - |H \cap R|
$$

Substituting the known values:

$$
95 = 60 + 45 - |H \cap R|
$$

Solving for $|H \cap R|$:

$$
|H \cap R| = 60 + 45 - 95 = 105 - 95 = 10
$$

Therefore, 10 students liked both hockey and rugby.

Step 4: Determine students who liked only one sport

- Students who liked only hockey:

$$
|H_{only}| = |H| - |H \cap R| = 60 - 10 = 50
$$

- Students who liked only rugby:

$$
|R_{only}| = |R| - |H \cap R| = 45 - 10 = 35
$$

- Students who liked neither:

Given as 18, as per the problem statement.

Step 5: Summarize the distribution

Category	Number of Students
Only Hockey	50
Only Rugby	35
Both Hockey and Rugby	10
Neither	18

Let's verify that these numbers sum to the total:

$$
50 + 35 + 10 + 18 = 113
$$

Confirmed.

Interpreting the Results and Implications

Understanding the distribution of student preferences provides valuable insights:

Student Engagement in Sports

- Majority Preference: The majority of students favor hockey (50 students), indicating a potential focus for hockey-related activities.
- Overlap Area: 10 students enjoy both sports, suggesting opportunities for combined sporting events or cross-promotional activities.
- Room for Growth: 18 students dislike both sports, presenting an opportunity to introduce or promote alternative activities that may appeal to them.

Resource Allocation

- Knowing the number of students interested in each sport helps allocate resources such as equipment, coaching staff, and facilities efficiently.
- For example, with 50 students liking hockey, investing in hockey equipment and training sessions could be prioritized.

Encouraging Participation

- Recognizing students who dislike both sports can guide school administrators to diversify sports offerings or encourage participation through new initiatives.
- Organizing introductory sessions or alternative sports might attract those students.

Additional Considerations and Advanced Insights

While the above calculations provide a clear picture of students' preferences, several additional factors can influence sports participation and planning:

Multiple Sports Preferences

- The analysis assumes only two sports, but students might like more, which would require more complex set analysis.
- Surveys could include more sports, providing richer data.

Changing Preferences

- Student interests can evolve over time, necessitating periodic surveys for updated data.
- Feedback mechanisms can help tailor sports programs to student preferences.

Impact of Demographics and Other Factors

- Factors such as age, gender, and academic performance can influence sports preferences.
- Data analysis can incorporate these variables to create targeted programs.

Conclusion

Calculating the distribution of students' sports preferences within a year group involves understanding set theory principles, particularly the concepts of union, intersection, and complement. In the given scenario, out of 113 students, 50 liked only hockey, 35 liked only rugby, 10 liked both, and 18 liked neither. These insights assist educators and school administrators in planning activities, allocating resources, and fostering a positive sports environment that caters to diverse interests. Regular data collection and analysis ensure that sports programs remain engaging and inclusive, ultimately promoting student health, teamwork, and school spirit.

Final Thoughts

Accurate data analysis and understanding of student preferences are crucial in creating effective and engaging sports programs. Applying set theory principles not only simplifies calculations but also provides a structured approach to interpreting survey data. Schools can leverage this information to enhance student participation, promote healthy lifestyles, and build a vibrant school community centered around sports and physical activities.

Keywords: student sports preferences, set theory in education, sports participation analysis, school sports planning, hockey and rugby statistics, student engagement in sports, data-driven school activities

Frequently Asked Questions

What is the total number of students in the year group?

113 students.

How many students liked either hockey or rugby or both?

113 total students minus 18 who liked neither, so 95 students liked hockey, rugby, or both.

How many students liked only hockey?

60 students liked hockey in total. Since 45 liked rugby and some may overlap, we need to find the number who liked both to determine those who liked only hockey.

How many students liked both hockey and rugby?

Using the inclusion-exclusion principle: (Number who liked hockey) + (Number who liked rugby) - (Number who liked either) = (Total liking either or both).

What is the number of students who liked only rugby?

Once the number of students who liked both is known, subtract that from the total who liked rugby to find those who liked only rugby.

Can you find the exact number of students who liked both hockey and rugby?

Yes. Total students liking either or both = 113 - 18 = 95. Using the formula: (Hockey) + (Rugby) - (Both) = (Either). So, 60 + 45 - (Both) = 95, which gives (Both) = 10 students.

Additional Resources

In A Year Group Of 113 Students, 60 Liked Hockey, 45 Liked Rugby, And 18 Liked Neither — these types of problems are classic examples of set theory and Venn diagram applications. They are common in mathematics, especially in questions related to the union, intersection, and complement of sets. Understanding how to approach such problems is essential for students and professionals alike, as it enhances logical thinking and problem-solving skills. In this guide, we will explore a detailed, step-by-step approach to solve this problem, breaking down the concepts involved, and providing a comprehensive understanding of how to find the total number of students who liked either hockey, rugby, or both.

Understanding the Problem Statement

The problem provides the following data:

- Total number of students in the year group: 113
- Number of students who liked Hockey: 60
- Number of students who liked Rugby: 45
- Number of students who liked neither sport: 18

From this, we need to determine a specific quantity — typically, the number of students who liked either hockey, rugby, or both.

Key Concepts and Terminology

Before diving into calculations, let's clarify some essential set theory concepts:

- Set: A collection of distinct objects or elements. Here, the sets are students who liked Hockey and students who liked Rugby.
- Union ($A \cup B$): The set of students who liked either Hockey, Rugby, or both.
- Intersection ($A \cap B$): The set of students who liked both Hockey and Rugby.
- Complement: Students who did not like a particular sport.
- Total Population: The total number of students in the group, which is 113.

Step-by-Step Approach to Solving the Problem

Let's systematically analyze the problem:

Step 1: Define the sets

- Let H be the set of students who liked Hockey.
- Let R be the set of students who liked Rugby.

Step 2: Gather the known data

- Total students, T = 113
- Students who liked Hockey, |H| = 60
- Students who liked Rugby, |R| = 45
- Students who liked neither, |N| = 18

Since students who liked neither sport are explicitly given, this helps us find the number of students who liked at least one of the sports.

Step 3: Find students who liked at least one sport

Students who liked either hockey, rugby, or both are:

$$ |H \cup R| = T - |N| = 113 - 18 = 95 $$

This is an essential step because the total number of students who liked at least one sport is the total minus those who liked none.

Step 4: Use the formula for the union of two sets

The basic set theory formula:

$$ |H \cup R| = |H| + |R| - |H \cap R| $$

Rearranged to find the intersection:

$$ |H \cap R| = |H| + |R| - |H \cup R| $$

Plugging in known values:

$$ |H \cap R| = 60 + 45 - 95 = 105 - 95 = 10 $$

Thus, 10 students liked both hockey and rugby.

Step 5: Summarize the findings

- Students who liked both sports: 10
- Students who liked only hockey:

$$ |H \text{ only}| = |H| - |H \cap R| = 60 - 10 = 50 $$

- Students who liked only rugby:

$$ |R \text{ only}| = |R| - |H \cap R| = 45 - 10 = 35 $$

- Students who liked neither: 18

Final Breakdown of the Student Preferences

Category	Number of Students	Explanation
Liked only Hockey	50	Students who liked Hockey but not Rugby
Liked only Rugby	35	Students who liked Rugby but not Hockey
Liked both	10	Students who liked both sports
Liked neither	18	Students who liked neither sport
Total students	113	Sum of all categories

Note: The sum of all categories matches the total number of students:

$$50 + 35 + 10 + 18 = 113$$

Interpreting the Results

This breakdown provides a clear picture of the preferences within the year group:

- The largest group liked only hockey.
- A significant number liked only rugby.
- A smaller, yet notable, group liked both sports.
- There is a uniform category of students who did not favor either sport.

Visualizing with a Venn Diagram

A Venn diagram can be a powerful visual tool to understand and verify these calculations:

- Draw two overlapping circles labeled Hockey and Rugby.
- Place 10 in the intersection.
- Place 50 in the Hockey-only part.
- Place 35 in the Rugby-only part.
- Outside both circles, mark 18 as students who liked neither.

This visualization confirms the calculations and helps in understanding the distribution.

Additional Considerations

While this example is straightforward, similar problems can become more complex with different data, such as:

- Multiple overlapping groups
- Additional preferences
- Partial overlaps

Understanding the basic principles outlined here provides a foundation for tackling more advanced set theory problems.

Practical Applications

Problems like this are not just academic exercises; they have real-world relevance in:

- Market research (e.g., understanding customer preferences)
- Polling and survey analysis
- Event planning (e.g., estimating attendance based on interests)
- Data analytics and decision-making processes

Mastering the approach enhances analytical skills across various fields.

Conclusion

In summary, given the data:

- Total students: 113
- Liked Hockey: 60
- Liked Rugby: 45
- Liked Neither: 18

We determined that:

- The number of students who liked either hockey, rugby, or both is 95.
- The number of students who liked both sports is 10.
- Those who liked only one sport are 50 (hockey) and 35 (rugby).

This problem exemplifies how set theory provides a systematic approach to solving real-world combinatorial problems involving overlapping groups. By understanding the fundamental formulas and steps, you can confidently analyze similar problems, whether in academics, research, or practical scenarios.

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