LESSON MAKER PRO

Venn Diagram Detectives

Use set relationships to count without double-counting.

HIGH SCHOOL · MA.912.LT.5.5

MA.912.LT.5.5 "Explore relationships and patterns and make arguments about relationships between sets using Venn Diagrams."

NAME _____ DATE _____

COUNT THE OVERLAP

A Venn diagram shows where two or more sets overlap. To find the number in A or B, add the set totals and subtract the overlap once: n(A union B) = n(A) + n(B) - n(A intersection B).

WORKED EXAMPLE

At a reading club, 43 members listen to podcasts, 28 listen to audiobooks, and 6 listen to both. How many listen to podcasts or audiobooks?

1. Add the two set totals: 43 + 28 = 71.
2. The 6 members in both sets were counted twice.
3. Subtract the overlap: 71 - 6 = 65.

Answer: 65 members

PRACTICE 6 problems

1 In a survey, 31 students are in robotics, 26 are in coding, and 9 are in both clubs. How many students are in robotics or coding?

ANSWER _____

2 A group has 76 students. Of them, 34 play tennis, 29 play volleyball, and 11 play both. How many play neither sport?

ANSWER _____

3 Set A has 32 elements, Set B has 36 elements, and n(A union B) = 54. Find n(A intersection B).

ANSWER _____

4 At a school, 72 students were surveyed. Of them, 38 play basketball, 27 play soccer, and 12 play both. How many play neither basketball nor soccer?

ANSWER _____

5 An art club has 45 members who paint and 30 members who act. If 61 members paint or act, how many members do both?

ANSWER _____

6 In a Venn diagram, 16 elements are in Set A only, 21 are in Set B only, and 8 are in both sets. Find n(A union B).

ANSWER _____

APPLY IT Show your work

1 At a digital-media showcase, 90 students attended. Of the attendees, 44 use a video-editing app, 39 use a music-making app, and 17 use both apps. How many students use neither app? Draw two overlapping circles inside a rectangle for all 90 attendees; label the circles Video and Music. Put the number of students in each of the four regions: video only, music only, both, and neither. Use your completed Venn diagram to answer the question, check that all four regions sum to 90, and explain why the overlap is counted once. Your teacher can first model the blank circles and rectangle on paper; submit your own completed diagram.

WORK SPACE

ANSWER _____

2 At a gaming club event, 84 students attended. Of the attendees, 52 play esports, 35 create video games, and 14 do both. How many students do neither activity?

WORK SPACE

ANSWER _____

CHALLENGE One step up

One hundred students attended an activities festival. Of these students, 48 joined debate, 41 joined a science demonstration, and 37 joined an art lab. Also, 15 joined both debate and science, 12 joined both debate and art, 10 joined both science and art, and 4 joined all three. How many students joined exactly one activity, and how many joined none? Explain your reasoning.

WORK SPACE AND ANSWER

ANSWER KEY

Venn Diagram Detectives

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	In a survey, 31 students are in robotics, 26 are in coding, and 9 are in both clubs. How many students are in robotics or coding?	**48 students**
2	A group has 76 students. Of them, 34 play tennis, 29 play volleyball, and 11 play both. How many play neither sport?	**24 students**
3	Set A has 32 elements, Set B has 36 elements, and n(A union B) = 54. Find n(A intersection B).	**14**
4	At a school, 72 students were surveyed. Of them, 38 play basketball, 27 play soccer, and 12 play both. How many play neither basketball nor soccer?	**19 students**
5	An art club has 45 members who paint and 30 members who act. If 61 members paint or act, how many members do both?	**14 members**
6	In a Venn diagram, 16 elements are in Set A only, 21 are in Set B only, and 8 are in both sets. Find n(A union B).	**45**

PART 2 · APPLY IT

1. **24 students** The number who use at least one app is 44 + 39 - 17 = 66. Subtract from 90 to get 24 students who use neither app. Require the completed diagram: video only 27, music only 22, both 17, neither 24. The four regions total 90; overlap belongs to both sets but is one group of students.
2. **11** The number who do at least one activity is 52 + 35 - 14 = 73. Subtract 73 from 84 to get 11.

CHALLENGE

64 students joined exactly one activity, and 7 students joined none. Exactly one: (48 - 15 - 12 + 4) + (41 - 15 - 10 + 4) + (37 - 12 - 10 + 4) = 25 + 20 + 19 = 64. At least one: 48 + 41 + 37 - 15 - 12 - 10 + 4 = 93, so 100 - 93 = 7 joined none.

Provide paper and model a blank two-circle Venn diagram inside a universal-set rectangle before Apply 1. For Apply 1, require the learner's completed, labeled diagram and overlap explanation; a formula alone is preparation, not the whole response. Accept equivalent correct formulas for other items. For the challenge, accept any correct explanation accounting for all three activities.