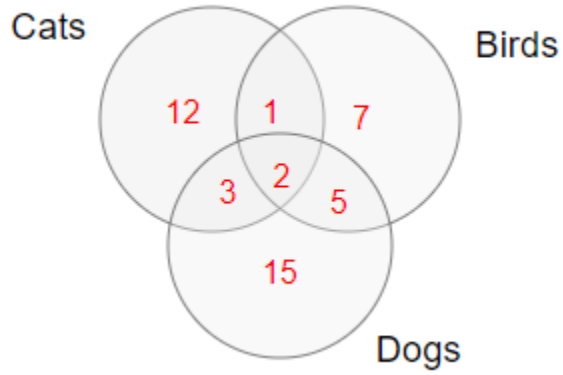
Math 30-2 Set Theory Lesson 4 Practice Questions[Solutions at the end]

Use the Venn diagram below to answer the first question.

A survey of 51 Junior High students gathered data regarding the ownership of cats, dogs and birds. The partial results are displayed below.



1. A) How many students owned neither a cat, a dog, or a bird?
   B) How many students owned exactly one of these three pets?
   C) How many students owned all three?
   D) How many students owned a cat or a dog?
   E) How many students owned a bird and a cat?

Use the following information to answer the next two questions.

As an assignment for a statistics course, Jim randomly selected 80 university students to ask about their attendance at athletic contests on campus. Specifically, they were asked if they had attended a hockey, a basketball and/or a volleyball game in the last year.

- 4 attended all three
- 16 attended hockey and basketball
- 5 attended basketball and volleyball
- 10 attended hockey and volleyball
- 31 attended basketball
- 41 attended hockey
- 15 did not attend any of these sports

2. The number of people who attended *only* volleyball is
   A) 6 B) 7 C) 8 D) 9

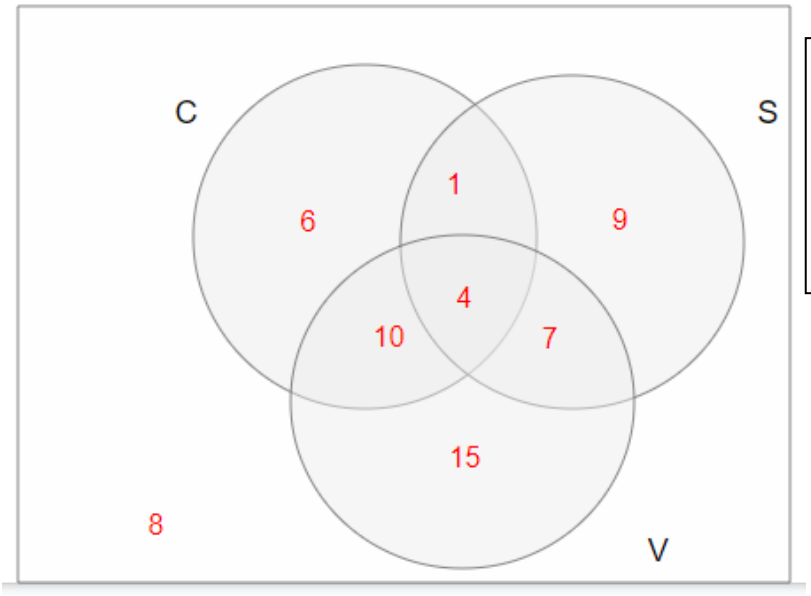
3. The number of people who attended at least 2 of the 3 sports is
   A) 20 B) 23 C) 27 D) 31

Use the following information to answer the next question.

Some math students undertook a survey to determine milkshake flavour preferences. These students went to the mall and asked 60 people to indicate if they had ever tried chocolate, strawberry or vanilla milkshakes.
The data revealed that:

- 4 people had all three
- 5 people had chocolate and strawberry
- 7 people had vanilla and strawberry
- 14 had chocolate and vanilla
- 9 had *only* strawberry
- 21 had chocolate
- 15 had *only* vanilla

The teacher then posed a question. How many people surveyed did not choose any of these 3 flavours?
One student's Venn diagram, and answer is shown below.



The student's answer:

There were 8 people who did not choose any of these flavours.

4. The student made an error. Identify the error and make the correction.

Use the following information to answer the next question.

A survey of a class of Junior High students was conducted seeking data on the type of Christmas gifts that were received.

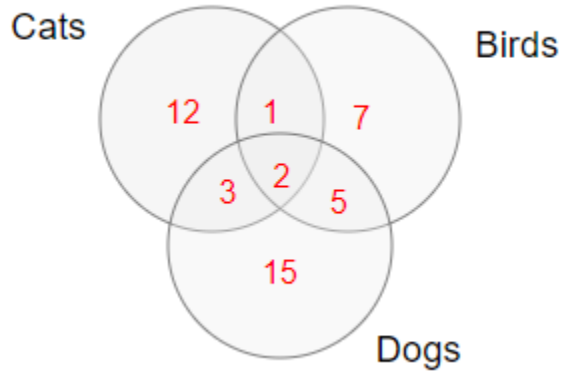
- 35 students received a book, clothes, or a game.
- 15 students received a book.
- 17 students received clothes.
- 19 students received a game.
- 3 received *only* a book and clothes.
- 4 received *only* a book and a game.
- 5 received *only* clothes and a game.

5. A) How many students received a book, clothes and a game?
   B) How many students received *only* a book or *only* a game? [NOTE: There is a similar question on p. 40-41 in the text]

Math 30-2 Set Theory Lesson 4 Practice Questions Solutions

Use the Venn diagram below to answer the first question.

A survey of 51 Junior High students gathered data regarding the ownership of cats, dogs and birds. The partial results are displayed below.



1. A) How many students owned neither a cat, a dog, or a bird?

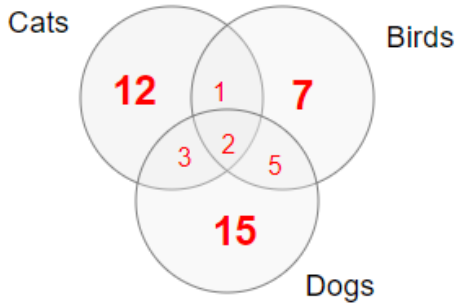
Solution

The sum of the 7 numbers in the circles is 45. There were 51 students surveyed. The difference between these two numbers represents the students who did not own any of these pets.

There are 6 students who owned neither a cat, a dog, or a bird.

B) How many students owned exactly one of these three pets?

Solution



The numbers 12, 7, and 15 represent the number of students who own *only* a cat, *only* a bird, and *only* a dog respectively. The answer is the sum of these numbers. There are 34 students who own exactly one pet.

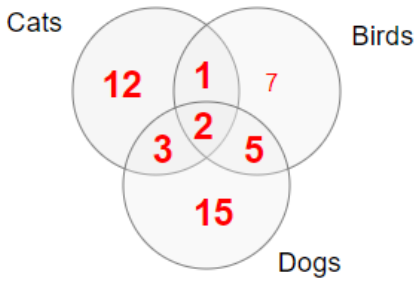
C) How many students owned all three?

Solution

The intersection of all three circles represents the number of students who own all three pets. There are 2 students who own all three.

D) How many students owned a cat or a dog?

Solution

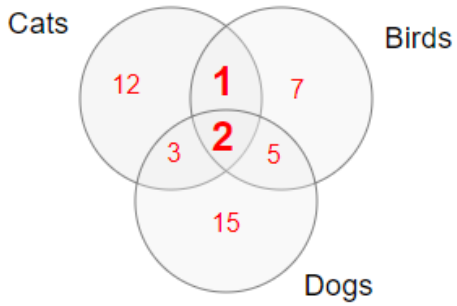


The number of students owning a cat or a dog is represented by the sum of all the numbers in the cat and dog circles. (12, 1, 2, 3, 5, 15)

There are 38 students who own a cat or a dog.

E) How many students owned a bird and a cat?

Solution



There are 3 people who own a bird and a cat.

Use the following information to answer the next two questions.

As an assignment for a statistics course, Jim randomly selected 80 university students to ask about their attendance at athletic contests on campus. Specifically, they were asked if they had attended a hockey, a basketball and/or a volleyball game in the last year.

- 4 attended all three
- 16 attended hockey and basketball
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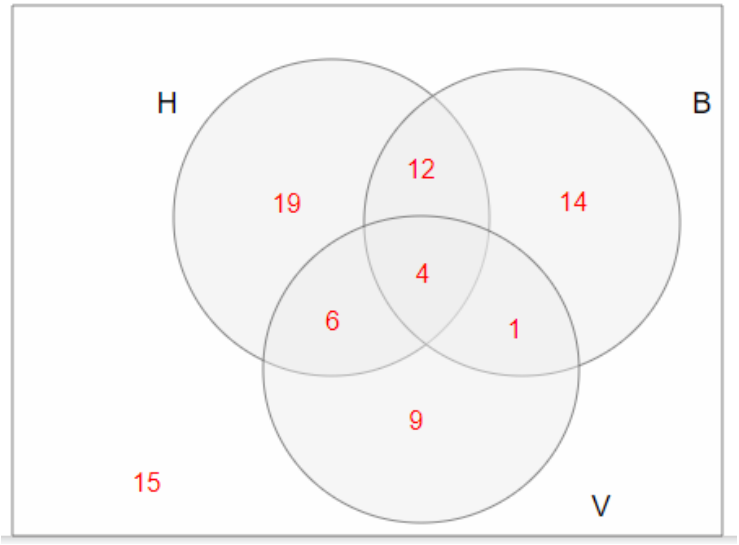
- 10 attended hockey and volleyball
- 31 attended basketball
- 41 attended hockey
- 15 did not attend any of these sports

2. The number of people who attended *only* volleyball is

A) 6 B) 7 C) 8 D) 9

Solution



When completing the diagram, begin with the over-lap of all 3 circles. This number is 4.

16 – 4 = 12

10 – 4 = 6

5 – 4 = 1

Subtract 4 from each of the "and" numbers given in the question.

Only hockey is the total of 41 subtract (4+6+12) or 22. Only hockey is 19.

Only basketball is the total of 31 subtract (4+12+1) or 14. Only basketball is 14.

Including the 15 who did not attend any of these sports, we now have all the numbers except the *only* volleyball. From the total of 80, subtract (15 + 19 + 12 + 14 + 6 + 4 +1).

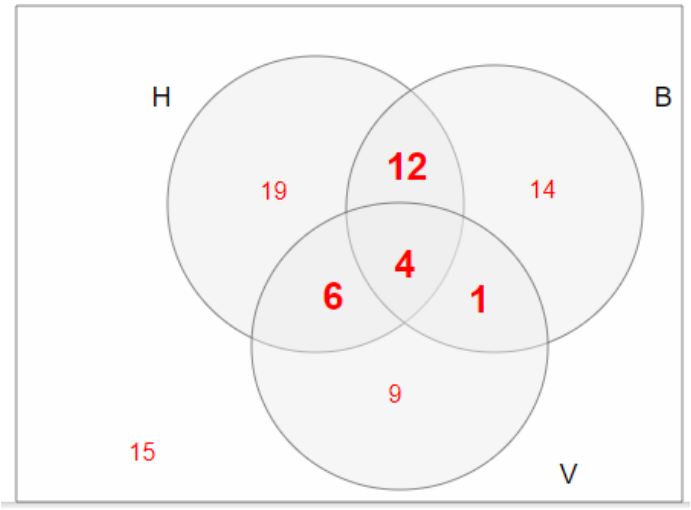
80 – 71 = 9

There are 9 people who attended *only* volleyball.

3. The number of people who attended at least 2 of the 3 sports is

A) 20 B) 23 C) 27 D) 31

Solution



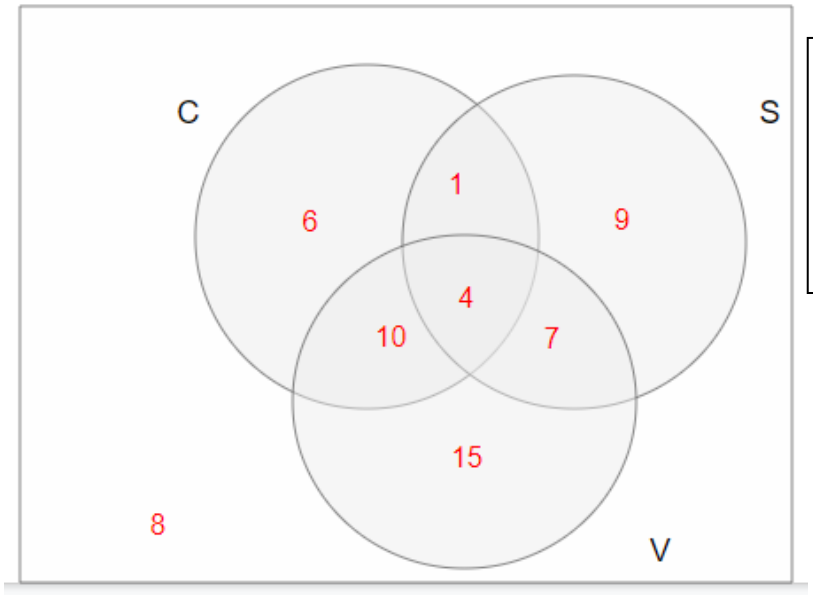
At least two sports means 2 or 3. The numbers 12, 6, and 1 represent the number of people who attended two sports, and the number 4 represents the number of people who attended 3 sports. The sum of these numbers is 23.

Use the following information to answer the next question.

Some math students undertook a survey to determine milkshake flavour preferences. These students went to the mall and asked 60 people to indicate if they had ever tried chocolate, strawberry or vanilla milkshakes.
The data revealed that:

- 4 people had all three
- 5 people had chocolate and strawberry
- 7 people had vanilla and strawberry
- 14 had chocolate and vanilla
- 9 had *only* strawberry
- 21 had chocolate
- 15 had *only* vanilla

The teacher then posed a question. How many people surveyed did not choose any of these 3 flavours?
One student's Venn diagram, and answer is shown below.

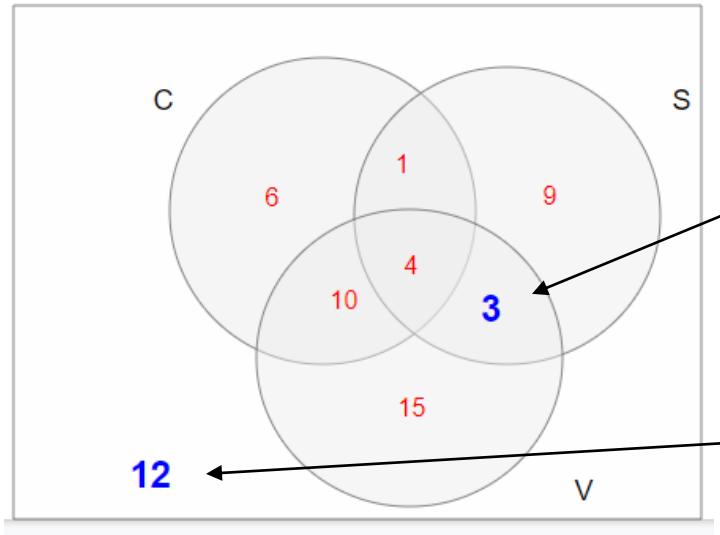


The student's answer:

There were 8 people who did not choose any of these flavours.

4. The student made an error. Identify the error and make the correction.

Solution



When we are told that 7 people had vanilla and strawberry, instead of writing 4 and 3 in the two appropriate over-lap areas, the student put 7 only in the one region. It should be 3.

Now add all the numbers in the circle (48) and subtract this from the universal number of 60.

There are 12 people who have not tried any of these flavours.

Use the following information to answer the next question.

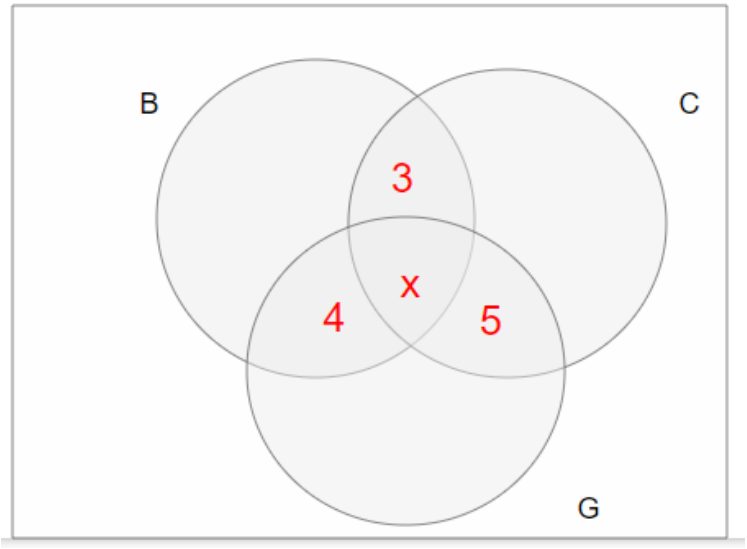
A survey of a class of Junior High students was conducted seeking data on the type of Christmas gifts that were received.

- 35 students received a book, clothes, or a game.
- 15 students received a book.
- 17 students received clothes.
- 19 students received a game.
- 3 received *only* a book and clothes.
- 4 received *only* a book and a game.
- 5 received *only* clothes and a game.

5. A) How many students received a book, clothes and a game?

   B) How many students received *only* a book or *only* a game?

Solution



Take the totals in each of the circles (15,17,19) and subtract three pairs of over-lap {(x+3)(x+4)(x+5)} and add x and set the equation equal to 35, which is the number who received a book, clothes or a game.

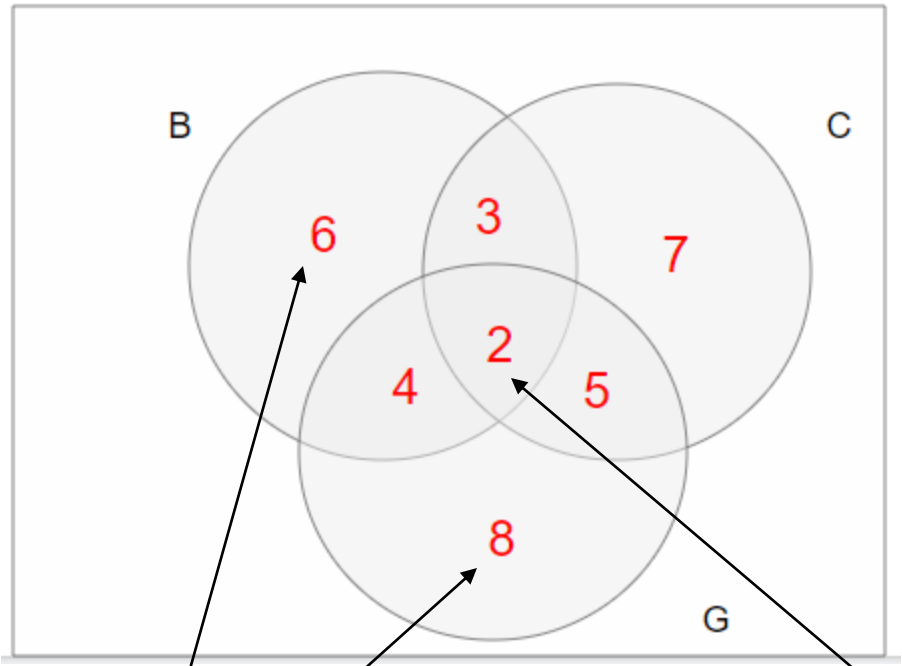
$15+17+19 - (x+3) - (x+4) - (x+5) + x = 35$

$51 - x - 3 - x - 4 - x - 5 + x = 35$

$39 - 2x = 25$

$4 = 2x$ **x = 2**

Use this information to complete the Venn diagram.



a) There are 2 students who received a book, clothes and a game.

b) There are 14 students who received only a book or only a game.