

Math Club Mystery

The math club took a field trip to see the movie *The Man Who Knew Infinity*. A total of 28 people went on the trip, including students, teachers, and parent chaperones. There were more parents than teachers.

Movie tickets cost \$7, but the students got a discount and only had to pay \$3 each. The group paid a total of \$108 to get everyone in. Determine how many students, how many teachers, and how many chaperones went on the trip.

How much can you figure out and be certain of about how many students teachers, and chaperones went on the trip?



Brian

Answer:

Kids = 22 Adults = 6 Parents = 4 Teachers = 2

Explanation:

N= kids

Y = Adults

$$3n+7y=108$$

$$y + n = 28$$

If y = 6

$$n = 22 \text{ so } 3 \times 22 = 66$$

$$66 + 7y = 108$$

$$7y = 108 - 66$$

$$7y = 42$$

$$y = 42 / 7$$

$$y = 6$$

So Kids = 22

Adults = 6

Because the parents > than teachers so $6 = 3+3$

4+2

so parents = 4

teachers = 2

Response From Mentor to Brian:

Hi Brian,

Thank you for sharing your answer for this problem of the week. You have done a nice job setting up the system of equations. You seem to have understood the relationships involved in this problem, but could you explain why and how you decided to try "if $y = 6$ " in your work below?

$$3n+7y=108$$

$$y + n = 28$$

$$\text{If } y = 6$$

$$n = 22 \text{ so } 3 \times 22 = 66$$

Could you explain how your equations relate the information in the problem? Could you explain your work as if you were teaching me how to do it?

Because the parents > than teachers so $6 = 3+3$

$$4+2$$

so parents = 4

teachers = 2

You correctly noted that the number of parents is greater than the number of teachers, but is there another combination of parents and teachers that would work? If not, how can you convince me that you've found the one and only combination that works? If so, how can you be sure you've found them all.

I am looking forward to hearing back from you. Good job on this problem!

Julie

Hannah:

Answer:

The answer to this problem is there will be 2 teachers, 4 parents and 22 students.

Explanation:

The way I found this problem was by making a chart and doing guess and check. On my first try I got 2 teachers, 4 parents and 22 students. That was the correct answer. Even though I got the answer on the first try it was just a guess.

If I were to come across a problem like this again I would start by doing another table of guess and check. By doing guess and check I would start with a random number. After that I would pick another random but higher number.

Response From Mentor to Hannah:

Hello Hannah,

I think you did a great job with this week's math problem! I noticed you used the 'Guess and Check' technique - which is always a great place to start a problem and to develop a deeper understandings in mathematics.

There are a lot of great connections you made and even more that we can discuss further! However, before we go into some of that, can you elaborate more on how you set your table up? How did you label your rows and columns? How were different parts of the table related to each other? Things like that :)

Thanks! And I look forward to your reflection!

-Mr Thompson

Kyle:

Answer:

1. There are 22 students, 4 parents, and 2 teachers totaling to 28 people.

Explanation:

The first thing i did to solve this problem was to create equations to fit the problem.

S = Students

P = Parents

T = Teachers

$$S+P+T=28$$

$$3S+7P+7T=108$$

But since there are 3 variables, I'll find the value of S by combing parents and teachers as adults (A).

The new equation will be

$$S+A=28$$

$$3S+7A=108$$

$$3(S+A=28) = 3S+3A=84$$

$$3S+3A=84$$

$$-3S+7A=108$$

$$-4A=-24$$

$$-4 \quad -4$$

$$A=6$$

$$S+6=28$$

$$3S+7(6)=108$$

$$S=22$$

$$A=6$$

There are 22 students and 6 adults.

I still need to figure out how many teachers and parent chaperones there are and I know there are more parents than teachers, and since they say 'teachers', there is more than one teacher. So there is 4 parents and 2 teachers.

$$22 + 4 + 2 = 28$$

$$22 + 6 = 28$$

$$3(22) + 7(4) + 7(2) = 108$$

$$66 + 28 + 14 = 108$$

$$80 + 28 = 108$$

I plugged all the numbers in and the answer seemed to be correct.

There are 22 students, 4 parents, and 2 teachers.

Reflection: This POW was a lot easier than many of the previous POW's. I noticed that we learned this type of problem before so it was familiar and that's what made it easy. The only confusing part was when they made us figure out the certain number. Mr. Compton made it easier to understand when he kind of explained the problem more and it helped a lot.

Response From Mentor to Kyle:

Hi Kyle,

Your work looks great and you were very clear in most of your work. I felt you really did a great job. I just hope to add a few comments that might help tidy up your work.

In your work you have:

$$3(S+A=28) = 3S+3A=84$$

Can you explain what you are doing in this step?

I am also wondering about the hint that Mr. Compton gave the class. If he didn't give the hint how could you have gone about solving the problem?

I found your method of using equations very useful and interesting. As a good habit, after or before creating equations, I might explain how you arrived at such equations. The reason being so that when you get to harder problems, you are able to jot down pieces of information from the problem that might be key in creating equations and in solving such a problem.

I would like to add that I really liked the way you analyzed the problem and communicated the reason of why your answer is the only one that makes sense given the information presented to you.

Great Work,

Johnny

Jacob:

Answer:

The answer is: 5 parents, 1 teacher, and twenty two kids.

Explanation:

At first I read the whole problem and I saw that there was some math. So I got a calculator. After that, we looked for clues. The first clue we found was there was 28 people in all. The second clue was that the parents and teachers had to pay \$7.00 and the kids tickets were \$3.00. And the third clue we found was that the total amount of money was \$108.00. Then finally we got the clue that there was more parents than teachers. So the answers that worked was that there were 5 parents, 1 teacher, and 22 kids. That was the first answer that worked. The second answer that could work was 4 parents, 2 teachers, and 22 kids this answer also works if you do the math. I think this problem could be useful in real life because if you bring a certain amount of money somewhere and you find out that's not enough that could really be bad. Also because if you give someone, for whatever reason, a certain amount of money and it's too much they might not give your change back. So you should always know how much money you have at all times. And also because if you lend someone money and they don't give the full amount back you might not notice. So that is another reason why you should always count your money.

Response From Mentor to Jacob:

Hi Jacob,

Great start picking out all the important clues in the problem. I'm glad that you found that two different solutions could work.

I'm wondering if you could describe how you found the right numbers, so that another student could follow along and do the problem the same way you did. Also, when you said, "[this answer also works if you do the math](#)", could you show me the math you are talking about? I think this would really help me understand what you did.

I like how you connected the problem to real life. It's always best to make sure you have enough money before you go to do something.

I hope you revise your submission so I can learn about how you did this problem.

Thanks,
Erica

Daniel:

Answer:

There were 8 students, 7 parent chaperons, and 5 teachers.

Explanation:

Facts:

total of 28 people

More parents than teachers

kids had to pay \$3, everyone else \$7

total cost of trip was \$108

my strategy:

After fooling around with a little trial and error, I decided that I needed to go about this in a more organized manner. If you add up the cost of one student, one teacher, and one parent, you get \$17. I decided to multiply this number, along with the number of people on the trip, until I had a remainder that could be filled in with extra amounts of any type, keeping in mind the fact that there must be more parents than teachers, and that it must add up to precisely \$108.

$$3+7(2)=17$$

$$2[3+7(2)]=34$$

$$4[3+7(2)]=68$$

$$6[3+7(2)]=102$$

$$6[3+7(2)]=102$$

From this point onwards, we have to start massaging the equation. Remember, with this, we still only have eighteen people. This means that there must be more students than we have currently surmised.

$$6 \text{ students}(\$18) + 6 \text{ parents}(\$42) + 6 \text{ teachers} (\$42) = \$102$$

$$8 \text{ students}(\$24) + 6 \text{ parents}(\$42) + 5 \text{ teachers} (\$35) = \$101$$

Now, we're only \$7 away from \$108. This is great! Now, all we need to do is add one more parent, because the problem says that there must be more parents than teachers. So:

$$8 \text{ students}(\$24) + 7 \text{ parents}(\$42) + 5 \text{ teachers} (\$35) = \$108$$

YAY! We have our answer. There were 8 students, 7 parent chaperons, and 5 teachers.

Response From Mentor to Daniel:

Hi Daniel!

It is wonderful that you included the known facts at the beginning of your solution. It is very helpful to identify these key points in the problem. However, your solution has a total of 20 people on the field trip instead of 28 people. Can you use your initial thoughts with the “trial and error” strategy to revise your solution? I would suggest categorizing parents and teachers into one group since they are both paying \$7.00. This will help you get closer to the necessary 28 people going on the field trip.

I look forward to working with you again when you revise your solution. Good luck.

Natalie