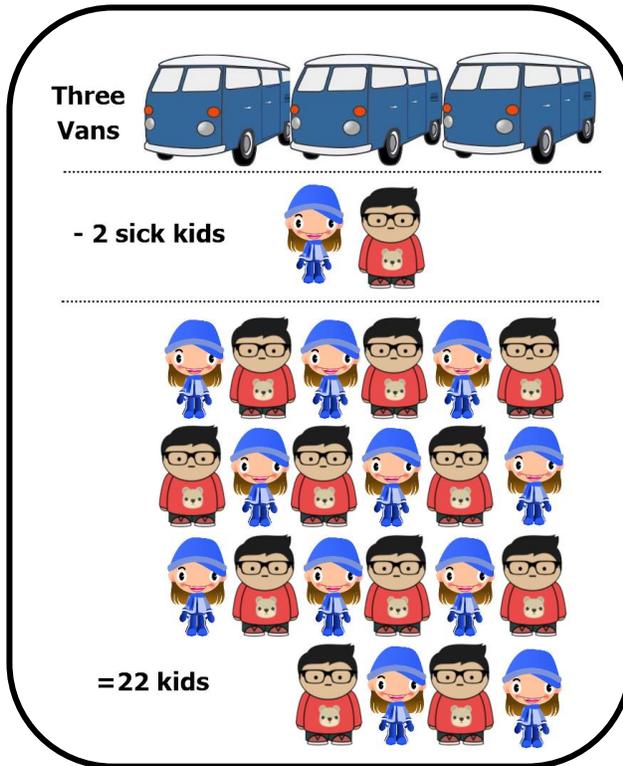


## Sick at the Fair

Equations with Division and Subtraction



A class full of students went on a field trip to the State Fair. During their time there, Rodrigo and Hien ate too much cotton candy and rode too many rides. They got sick and went back to lay down in one of the vans.

When the manager of the fair met with the teacher, he had a few questions.

"How many of your students are still at the fair?"

"Twenty-two," the teacher answered.

And how many vans did you bring?

"Three"

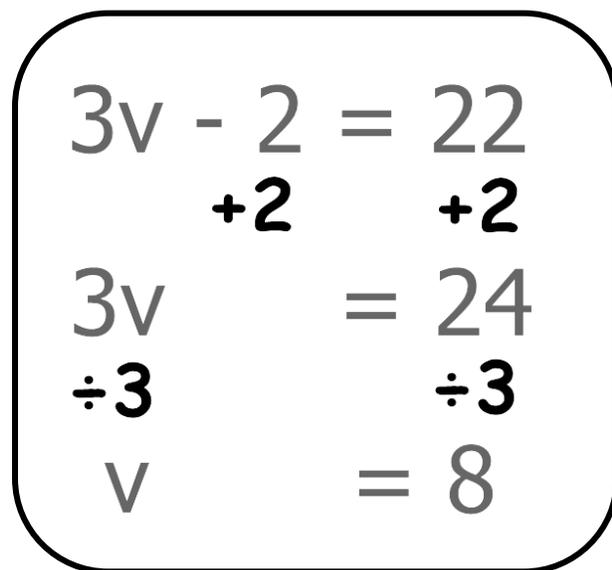
"Only three vans? I need to make sure you had enough seatbelts. How many students rode in each van?"

"Ummm...Let me think," the teacher answered.

1) Can you figure out how many students rode in each van? Explain your steps

### A Similar Equation

2) What is the solution to the equation  $3v + 2 = 29$  ?

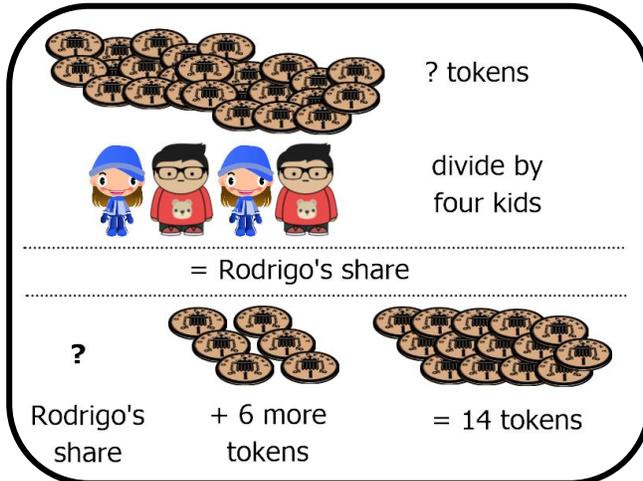


3) The puzzle of the students in the vans can be modeled by the equation  $3v - 2 = 22$ . At left is an example diagram to solving question #3 on the back of this page. Study the diagram. Do you notice any similarities between these steps and the steps that you used when you figured out the number of students in each van? Do you notice any differences?

4) Compare the equations from problem #2 and #3. What was different about the steps in solving them?

5) You've probably realized by now that sometimes your first step in solving an equation is subtracting and other times, your first step is adding. How can you tell when you should add and when you should subtract?

### Birthday Tokens



The week after the field trip was Rodrigo's birthday party. Rodrigo was excited because the fair was still going on! Since he missed it last time, he begged his parents to take him and his friends to the fair for his birthday.

Rodrigo's parents bought game tokens for Rodrigo and his three friends to play the carnival games (four kids total, including Rodrigo). They divided the tokens so that each friend got an equal amount. Rodrigo also had six tokens left over from the

previous week. (He didn't get to use them because he got sick.)

Rodrigo and Khine compared their tokens and counted that Rodrigo now had 14.

"Your parents are pretty cool," Khine said. "How many total tokens did they buy for you and all your friends?"

- 6) Can you figure out how many tokens were bought by Rodrigo's parents?
- 7) If you haven't yet, write an equation to fit the situation. After you try, compare your answer to the example equation at the bottom of this page.
- 8) There are three numbers and a variable in the example equation. What does each number represent in the story of Rodrigo's tokens?
- 9) What does the variable represent?

Example Equation for Question 8)  $\frac{t}{4} + 6 = 14$

$$\begin{array}{r} \frac{t}{4} + 6 = 14 \\ \quad -6 \quad -6 \\ \hline \frac{t}{4} = 8 \\ \times 4 \quad \times 4 \\ \hline t = 32 \end{array}$$

**10)** Here are some example steps for solving the equation about Rodrigo's tokens. Study the steps. How are these steps similar to what we did with the previous equation,  $3v - 2 = 22$ ? (The question about the vans.) How are they different?

### Practice

Solve each equation or inequality

**11)**  $9z - 13 = 14$

**12)**  $50 = 14a - 20$

**13)**  $\frac{c}{10} - 1 = 15$

**14)**  $19 = \frac{b}{4} - 22$

**15)**  $3d + 18 = 81$

**16)**  $5 = \frac{f}{7} - 13$

**17)**  $6g - 20 > 22$

**18)**  $13 > \frac{h}{3} - 8$

**19)**  $\frac{m}{5} - 2 \leq 58$

**20)**  $206 \geq 2n + 188$

**21)**  $57.5 < 4p - 6.5$

**22)** Refer to the equation below. Fill in the blanks to describe the best approach to solving this equation.

$$17q - 4,500 = 549$$

Add \_\_\_\_\_ to both sides, then divide both sides by \_\_\_\_\_.

### Notes

Add the two equation diagrams to your notes (The diagrams by Questions #3 and #10)

### Challenge

**23)** Fill in the blanks to create a true equation.

$$\frac{\square}{12} + \square = 33$$

**Challenge, cont.**

24) Find a different way to fill in the blanks to create a different true equation.

$$\frac{\square}{12} + \square = 33$$

25) Write an equation that requires two steps. The equation itself should include subtraction or division. (So that the person solving your equation will need to multiply or add.)

**Answers**

1) There were 8 students in each van      2)  $v = 9$

4) To solve the equation from question #2, your first step is to subtract two from both sides. To solve the equation from question #3, our first step is to ADD two to both sides.

5) If the equation is written with addition, solve by subtracting. If the equation is written with subtraction, solve by adding. In other words, do the opposite of what is written in the equation.

6) Rodrigo's parents bought 32 tokens.

8) The four is the number of kids that the tokens were divided by. The six is the extra tokens that Rodrigo added to his share. The 14 is the total tokens Rodrigo had after he combined his tokens.

9) The "t" represents the unknown number of total tokens.

10) The last step in solving this equation is to multiply both sides by 4. We haven't yet solved an equation that required multiplying.

11)  $z = 3$                       12)  $a = 5$                       13)  $c = 160$

14)  $b = 164$                     15)  $d = 21$                     16)  $f = 126$

17)  $g > 7$                     18)  $h < 63$                     19)  $m \leq 300$

20)  $n \geq 9$                     21)  $p > 16$

22) Add 4,500 to both sides, then divide both sides by 17.