Equal Groups and Equal Sharing Problems

In the following problems, identify the *number of groups* , the *group size*, and the *product* (or *total*). In each problem, one of these quantities will be what the question is asking for. Then demonstrate the answer to each problem in each of the following ways:

- Physically represent the solution using counters, or explain why counters are inappropriate for this problem.
- Represent the solution using a number line.
- Write an equation showing the operation that the problem is asking you to perform.

1. Megan has 5 bags of cookies. There are 3 cookies in each bag. All together she has 15 cookies.
2. Bart has 24 pencils. They are packed 6 pencils to a box. How many boxes of pencils does he have?
3. There are 27 children in the class. We want to divide the class into 3 teams with the same number of children on each team. How many children will there be on each team?
4. Three children want to share 5 candy bars so that each person gets the same amount. The candy bars are the same size. How much can each child have?
5. Kito and Frida have 13 cookies. If they share the cookies equally, how many cookies would each person get?
6. There are 10 yards of ribbon for 4 people to share. How many yards of ribbon can each person get if they share the ribbon equally?
7. Three friends were at a Mexican restaurant. They were feeling hungry, so they ordered 8 burritos to eat. They want to share the burritos equally and eat them all. How much will each friend get to eat?

Children's Strategies for Equal Sharing Problems

The following are student responses to the following problem:
Three children want to share 5 candy bars so that each person gets the same amount. The candy bars are the same size. How much can each child have?

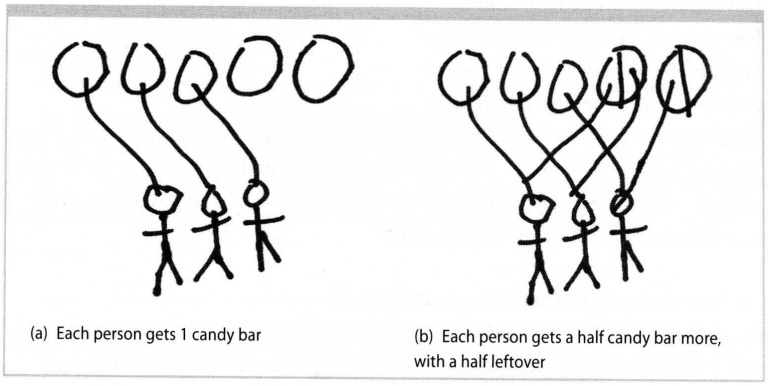


Figure 1–7. *Michelle's incomplete strategy*

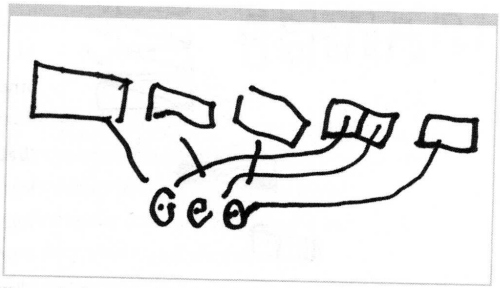


Figure 1–8.
Miguel's incomplete strategy

Can you explain what each student is doing? Why are these "incomplete" strategies?

(Adapted from Empson, S.B. & Levi, L. (2011). *Extending Children's Mathematics: Fraction and Decimals*. Portsmouth, NH: Heinemann.)

More Children's Strategies for Equal Sharing Problems

Explain each student's strategy for solving the given problem. What can you say about what this student understands?

1. Six children want to share 4 candy bars so that each gets the same amount. How much can each child have?

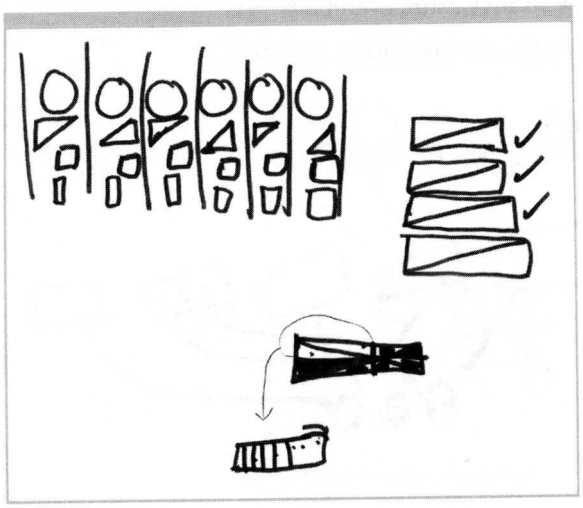


Figure 1–9.
Nonanticipatory Coordination: repeated halving

2. Eight kids were sharing 10 small pizzas. How much pizza would each kid get if they share the pizza equally?

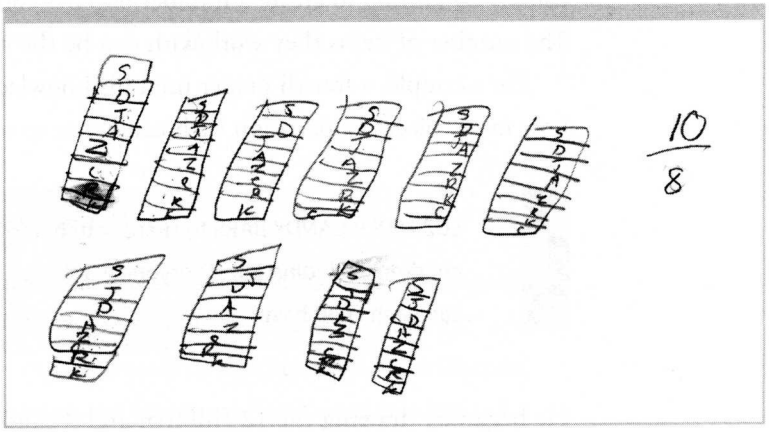


Figure 1–11.
Additive Coordination strategy, one item at a time

(Adapted from Empson, S.B. & Levi, L. (2011). *Extending Children's Mathematics: Fraction and Decimals*. Portsmouth, NH: Heinemann.)

Multiple Groups Problems

In the following problems, identify the *number of groups* , the *group size*, and the *product* (or *total*). In each problem, one of these quantities will be what the question is asking for. Then demonstrate the answer to each problem in each of the following ways:

- Draw a picture (or a number line) representing the solution to this problem.
- Write an equation showing the operation that the problem is asking you to perform.

1. Ms. Jones wants to feed each of the children she babysits a half sandwich for lunch. If she babysits 8 children, how many sandwiches should she make?
2. Nick made 6 small cakes for his birthday party. He thinks each person will each half of a cake. How many people can be at the party, if everyone eats this much?
3. It takes ¼ yard of fabric to make a pillow. How many pillows could I make with 3 yards of fabric?
4. Eric has 6 bags with 5/6 pound of clay in each bag. How many pounds of clay does he have altogether?
5. Kennedy has 4 pounds of M&Ms to make party favors. It takes 1/3 pound of M&Ms to fill 1 bag. How many bags of M&Ms can Kennedy fill with her M&Ms?

Children's Strategies for Multiple Groups Problems

Explain each student's strategy for solving the given problem. What can you say about what this student understands?

1. The zookeeper has 4 cups of frog food. His frogs eat 1/3 cup of food each day. How long can he feed the frogs before the food runs out?

   Strategy 1 (Jack):

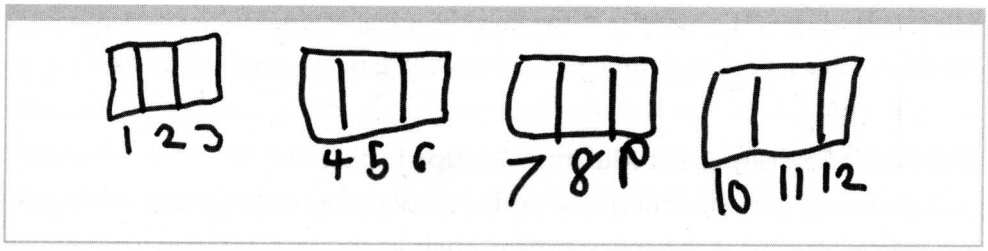


Figure 3–2. *Jack's strategy for the frog problem*

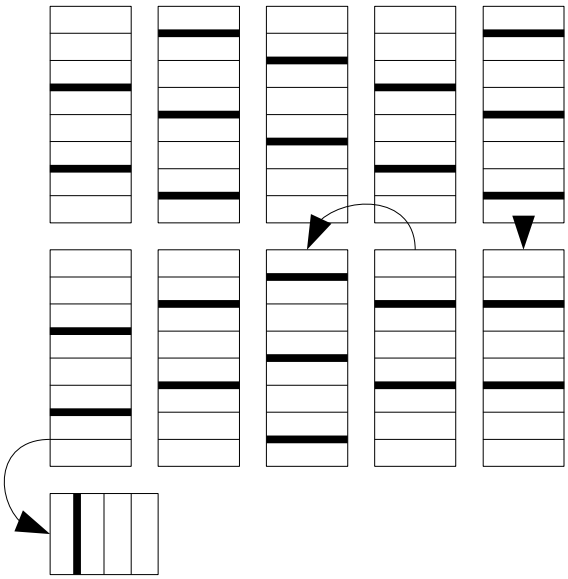
Strategy 2 (Kay): $\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=1$, $1+\frac{1}{3}=1\frac{1}{3}$, $1\frac{1}{3}+\frac{1}{3}=1\frac{2}{3}$, $1\frac{2}{3}+\frac{1}{3}=2$, $2+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=3$, $3+\frac{1}{3}+\frac{1}{3}+\frac{1}{3}=4$ Answer: 12 days

(Adapted from Empson, S.B. & Levi, L. (2011). *Extending Children's Mathematics: Fraction and Decimals*. Portsmouth, NH: Heinemann.)

2. Nina has 10 ½ yards of fabric to make pillows. If each pillow takes 3/8 of a yard of material, how many pillows can Nina make before she runs out of fabric?

Strategy 1 (Grace):

Figure 3–4.
Grace's strategy for $10\frac{1}{2} \div \frac{3}{8}$



Strategy 2 (Nishi):

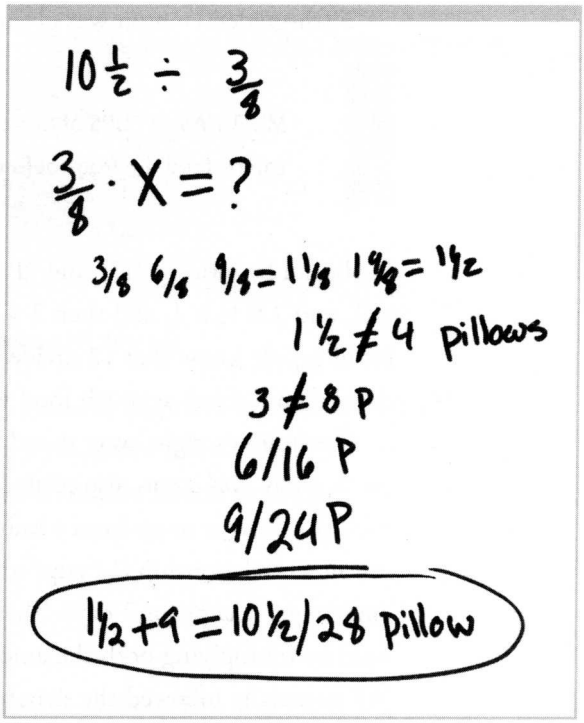


Figure 3–8. *Nishi's strategy*

(Adapted from Empson, S.B. & Levi, L. (2011). *Extending Children's Mathematics: Fraction and Decimals*. Portsmouth, NH: Heinemann.)