Relationships between Quantities

Let's try to solve some new kinds of problems.

1.1 Pricing Theater Popcorn

A movie theater sells popcorn in bags of different sizes. The table shows the volume of popcorn and the price of the bag.

Complete one column of the table with prices where popcorn is priced at a constant rate. That is, the amount of popcorn is proportional to the price of the bag. Then complete the other column with realistic prices where the amount of popcorn and price of the bag are not in proportion.

volume of popcorn (ounces)	price of bag, proportional ($)	price of bag, not proportional ($)
10	6	6
20		
35		
48		

1.2 Entrance Fees

A state park charges an entrance fee based on the number of people in a vehicle. A car containing 2 people is charged $14, a car containing 4 people is charged $20, and a van containing 8 people is charged $32.

1. How much do you think a bus containing 30 people would be charged?

2. If a bus is charged $122, how many people do you think it contains?

3. What rule do you think the state park uses to decide the entrance fee for a vehicle?

1.3 Making Toast

A toaster has 4 slots for bread. Once the toaster is warmed up, it takes 35 seconds to make 4 slices of toast, 70 seconds to make 8 slices, and 105 seconds to make 12 slices.

1. How long do you think it will take to make 20 slices?

2. If someone makes as many slices of toast as possible in 4 minutes and 40 seconds, how many slices do you think they can make?

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Are you ready for more?

What is the smallest number that has a remainder of 1, 2, and 3 when divided by 2, 3, and 4, respectively? Are there more numbers that have this property?

Lesson 1 Summary

In much of our previous work that involved relationships between two quantities, we were often able to describe amounts as being so much more than another, or so many times as much as another. We wrote equations like $x + 3 = 8$ and $4x = 20$ and solved for unknown amounts.

In this unit, we will see situations where relationships between amounts involve more operations. For example, a pizza store might charge the amounts shown in the table for delivering pizzas.

number of pizzas	total cost in dollars
1	13
2	23
3	33
5	53

We can see that each additional pizza adds \$10 to the total cost, and that each total includes a \$3 additional cost, maybe representing a delivery fee. In this situation, 8 pizzas will cost $8 \cdot 10 + 3$ and a total cost of \$63 means 6 pies were ordered.

In this unit, we will see many situations like this one, and will learn how to use diagrams and equations to answer questions about unknown amounts in the situation.