Popping Corn

Common Core Standard

7.RP.2a  Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

The Task

There are many different ways to make popcorn, including the hot air popper and the hot oil popper. The air popper produces 14 cups of popcorn in 2 ½ minutes. The oil popper produces 16 cups in 3 ½ minutes. Is there a proportional relationship between the quantity of popcorn and the time it takes to make it? Justify your answer.

Facilitator Notes

1. Introduce the task to the students. Allow students a few minutes to read the task and begin to develop a strategy for solving.
2. Show students the photos of the two types of poppers.
3. Provide students with a variety of materials and manipulatives, including but not limited to tables, graph paper, and graphing calculators.
4. Next, have students work in pairs or small groups to solve the problem. Have groups record their strategy.
5. As groups work, circulate to monitor what strategies are being used to solve the problem. Once groups have had an opportunity to solve the task, have groups compare solutions and strategies (either through a gallery walk, a jigsaw, or through group presentations).
6. Make sure to highlight key ideas, such as multiplicative reasoning, equivalent ratios/fractions, linear relationships, and constants of proportionality, and how these connect to determining whether two (or more) quantities are in a proportional relationship.

Follow-Up Questions

1. The microwave popcorn produces 5 cups in 2 ½ minutes. How does the rate for the microwave popcorn compare to the other two methods?
Extension Activity

1. Speed is not the only factor people consider when choosing a method to make popcorn. There is also the cost of the popcorn, oil, etc. If the corn for air popping costs $11.95 per 20 batches, the packets for the oil popper cost $22.30 per 24 batches, and microwave popcorn costs $28.99 per 30 batches, which method is the least expensive?

Solutions

The air popper produces 5.6 cups per minute. The oil popper produces approximately 4.6 cups per minute. The relationship between the quantity of popcorn and the time it takes to make it is not proportional because the unit rates are not equal.

Follow Up Questions:
The microwave popcorn produces 2 cups per minute. The air popper is the fastest of the three methods.

Extension Activity:
The corn for air popping costs $0.60 per batch (4.3 cents per cup). The packets for the oil popper costs $0.93 per batch (5.8 cents per cup). The microwave popcorn costs $0.97 per batch (19.4 cents per cup).

The air popped corn is the least expensive. If students only look at the price per batch, they might say that the cost for the oil popped corn and the microwave corn is similar. Looking at the quantity produced in each batch clarifies that the microwave popcorn is the most expensive.