

Hungry Monsters

The Problem:

Three tired and hungry monsters went to sleep with a bag of cookies. One monster woke up and ate $\frac{1}{3}$ of the cookies, then went back to sleep. A second monster then woke up and ate $\frac{1}{3}$ of the remaining cookies before going back to sleep. Finally, the third monster woke up and ate $\frac{1}{3}$ of the remaining cookies. When she was finished there were 8 cookies left. How many cookies were in the bag originally? This problem is adapted from the references on the next page.

Approaching the Problem:

Students might benefit from role playing or using objects to represent the cookies. A problem such as this allows many paths to a solution and is especially valuable when students are supported in:

- Finding connections between diverse strategies,
- Determining which solutions are correct, and
- Judging which solutions are more or less elegant. See the work of Watson (1988, reference is on the next page) for a nice collection of strategies used by a wide range of ages from primary students to third-year university. Or, you can just see what your students come up with.



Extending the Mathematical Territory:

By varying different aspects of the problem (the original amount of cookies, number of monsters, the fraction eaten by each monster, the remaining cookies), students can gain a deeper understanding of the relevant numerical relationships. Some variations make the problem easier, while some make it harder.

Consider the following examples:

- What happens if you add cookies to the problem? Under what conditions does this still allow whole-number solutions?
- What happens if you add more monsters-eating-a-third to the problem? Under what conditions does this still allow whole-number solutions?
- What happens if you choose a different fraction? Under what conditions does this allow whole-number solutions?
- What happens if each monster eats a different fraction of the cookies? Under what conditions does this allow whole-number solutions?
- What happens if you choose fractions that have numerators other than one? Under what conditions does this allow whole-number solutions?

Extending the Mathematical Territory:

Students might choose their own variations to explore. It is valuable for them to learn to appreciate the ways in which problems can be varied and how this allows them to more deeply explore a problem. This problem also allows a wide variety of solution strategies, some of which are available to primary children and some of which involve multiplication of fractions and/or more formal algebraic procedures. Used with intention, it can provide a bridge between intuitive strategies and more formal procedures.

References

Bennett, A. B. & Nelson, L. T. (1985). *Mathematics teaching: An informal approach* (2nd Ed. Boston: Allyn & Bacon.

Watson, J. (1988). Three hungry men and strategies for problem solving. In *For the Learning of Mathematics* 8(3), 20–27. The material on this page is from <http://galileonetwork.ca/earlylearning>, an Early Learning website and a joint venture of the Government of Alberta and Galileo Educational Network. For copyright information, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>