

**Math Domain** Number/Quantity Shape/Space Function/Pattern Chance/Data Arrangement**Math Actions** (possible weights: 0 through 4) 1 Modeling/Formulating 2 Manipulating/Transforming 2 Inferring/Drawing Conclusions 1 Communicating**Math Big Ideas** Scale Reference Frame Representation Continuity Boundedness Invariance/Symmetry Equivalence General/Particular Contradiction Use of Limits Approximation Other

The intent of this task is to have students demonstrate their ability to read and absorb a large amount of data, and to enumerate possible arrangements of those data consistent with a given set of constraints.

**1.** Some students may organize the possibilities through a table, or a diagram:

Some students may count without the use of a diagram, and mentally compute 3 girls giving 2 red and 2 blue hearts (a total of 6 red and 6 blue) and 2 boys giving 3 yellow and 1 green heart (a total of 6 yellow and 2 green).

- 2.** It is possible to interpret the statement as meaning that no information is available about the number of blue hearts. Although this temporarily makes the problem more complicated, the result turns out to be exactly the same. Clearly there will be some number of boys and some number of girls, since red and yellow hearts change hands. For the exchange of red hearts there are two possibilities; 3 girls give them all to 1 boy or 1 girl gives them to 3 boys. If the first possibility is used, there would be no green hearts changing hands. In the latter case there would be 6 green hearts, which corresponds to the given information. Checking how many hearts would be needed for 1 girl and 3 boys, we find that 3 red, 3 yellow and 6 green are the appropriate numbers.

	<b>partial level</b>	<b>full level</b>
<b>Modeling/ Formulating (weight: 1)</b>	Devise some sort of counting scheme which gives a reasonable representation of the described situation in <b>1</b> .	Devise a consistent counting scheme which gives a reasonable representation of the described situation in <b>1</b> and <b>2</b> .
<b>Transforming/ Manipulating (weight: 2)</b>	Implement the counting scheme correctly in <b>1</b> .	Work with the scheme in reverse in <b>2</b> .
<b>Inferring/ Drawing Conclusions (weight: 2)</b>	Make some attempt to use the model from <b>1</b> to answer <b>2</b> .	Successfully used the model invented in <b>1</b> to solve the problem in <b>2</b> .
<b>Communicating (weight: 1)</b>	Give an incomplete or unclear set of answers.	State all answers clearly, whether in prose or diagram form.