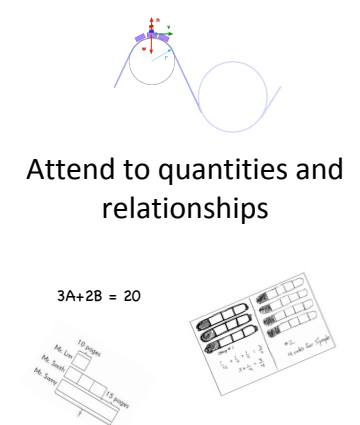
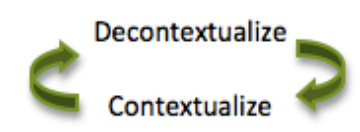


## Unpacking Mathematical Practice Standard #2

### Reason Abstractly and Quantitatively

Mathematically proficient students make sense of the quantities and their relationships in problem situations.

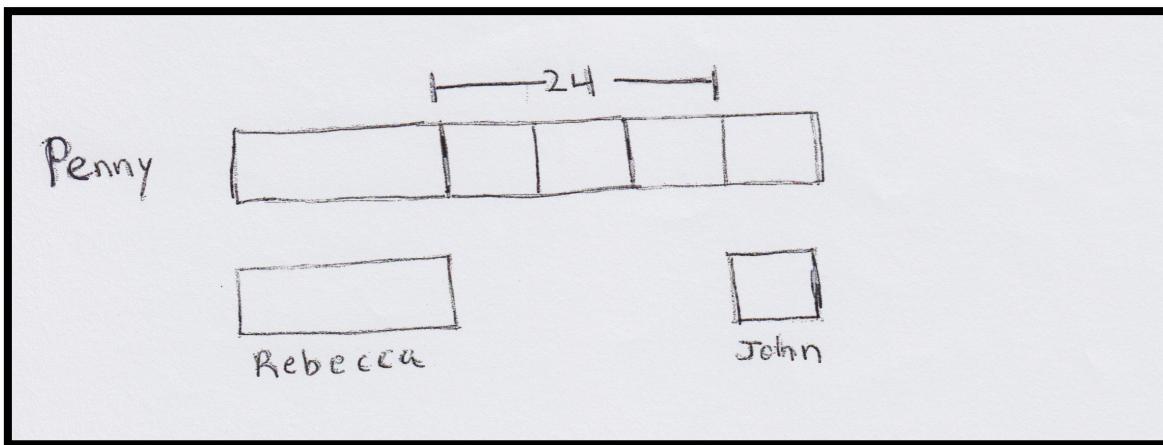
| Key Idea   | Description  | Learn to ask yourself questions like...   | Notes   |
|--|--|---|---|
|  <p>Attend to quantities and relationships</p> <p><math>3A+2B = 20</math></p> | <p>Using a variety of concrete and visual representations to highlight quantities, relationships between quantities, and the underlying mathematical structure of a problem situation</p>  | <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> What can I count or measure in this problem situation? i.e. what are the quantities?</li> <li><input checked="" type="checkbox"/> How do the quantities relate to each other?</li> <li><input checked="" type="checkbox"/> What's an effective way to represent the important information (i.e. quantities and relationships)?</li> <li><input checked="" type="checkbox"/> What "hidden" quantities and relationships are there?</li> </ul>   | <p>This math practice shifts our attention away from picking numbers out of a problem statement and focusing on the quantities to which those numbers refer</p>           |
|  <p>Decontextualize</p> <p>Contextualize</p>                                | <p><i>Decontextualize</i><br/>Abstracting a problem situation <u>and</u> manipulating that abstract representation without attending to referents</p> <p><i>Contextualize</i><br/>Recalling and considering the referents for the abstraction you are manipulating</p> | <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> How can I represent this problem (e.g. using symbols, diagrams, numbers, manipulatives, etc.)?</li> <li><input checked="" type="checkbox"/> How will manipulating this, without worrying about what it represents help right now?</li> <li><input checked="" type="checkbox"/> What does this (symbol/ diagram/ number/ variable) stand for?</li> <li><input checked="" type="checkbox"/> What does this number represent in the problem context? And, does that number make sense given the problem context?</li> </ul> | <p>"Abstracting" does not just mean using variables. Diagrams, numbers, manipulatives, invented symbols, etc. can all be used to decontextualize a problem situation.</p> |

## PENNY'S MARBLES SAMPLE DIAGRAMS

### Penny's Marbles Task

Penny had a bag of marbles. She gave one-third of them to Rebecca, and then one-fourth of the remaining marbles to John. Penny then had 24 marbles left in the bag. How many marbles were in the bag to start with?

### DIAGRAM A



### DIAGRAM B

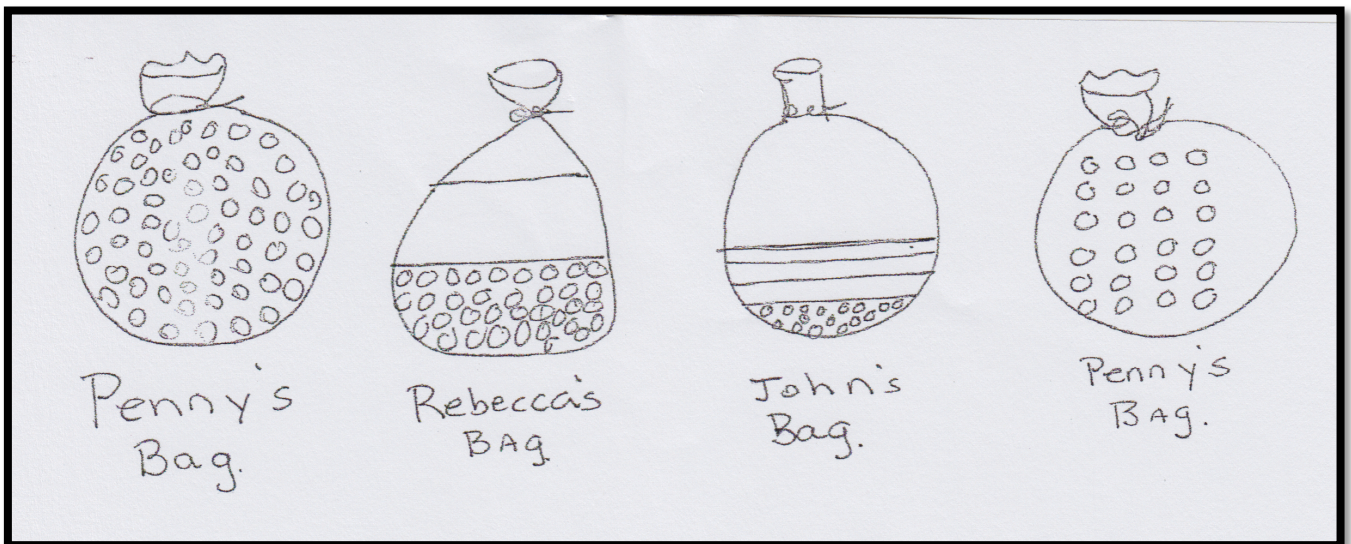




DIAGRAM C

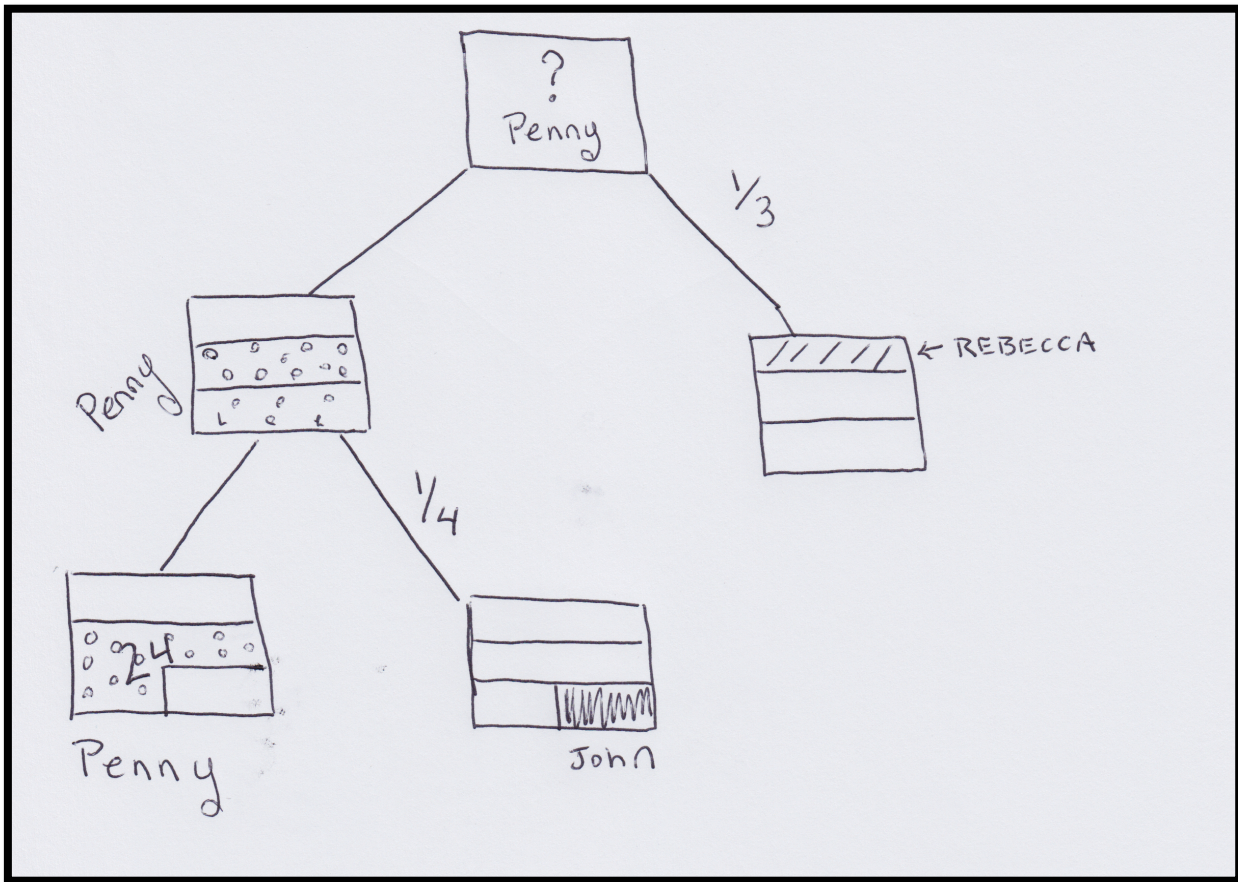


DIAGRAM D

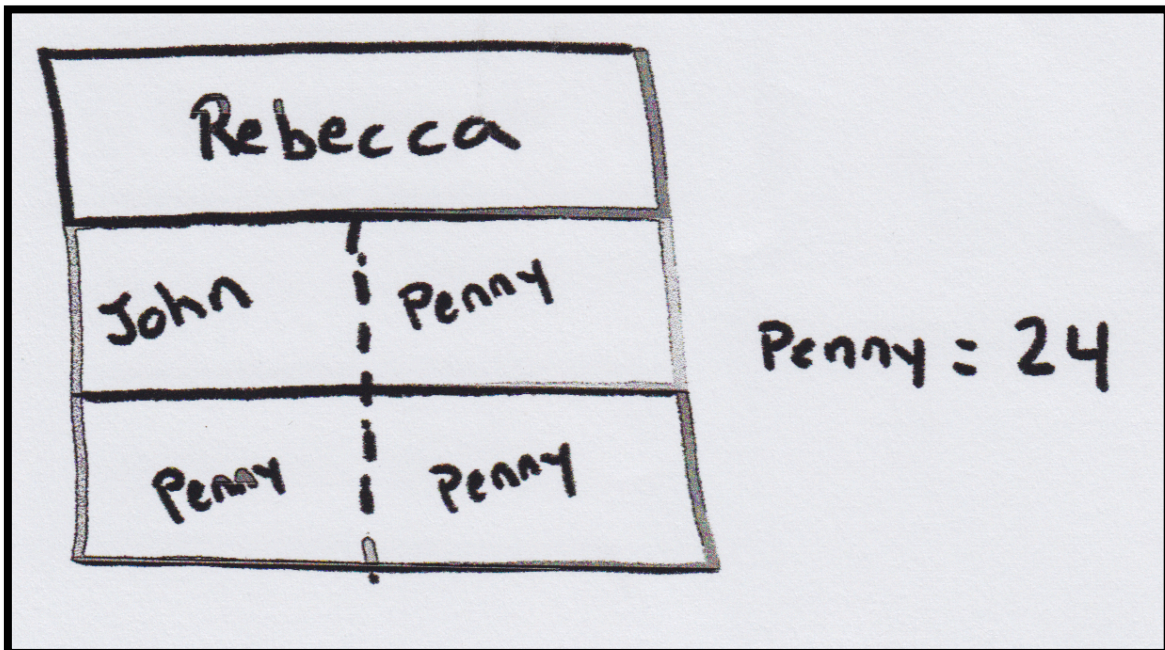




DIAGRAM E

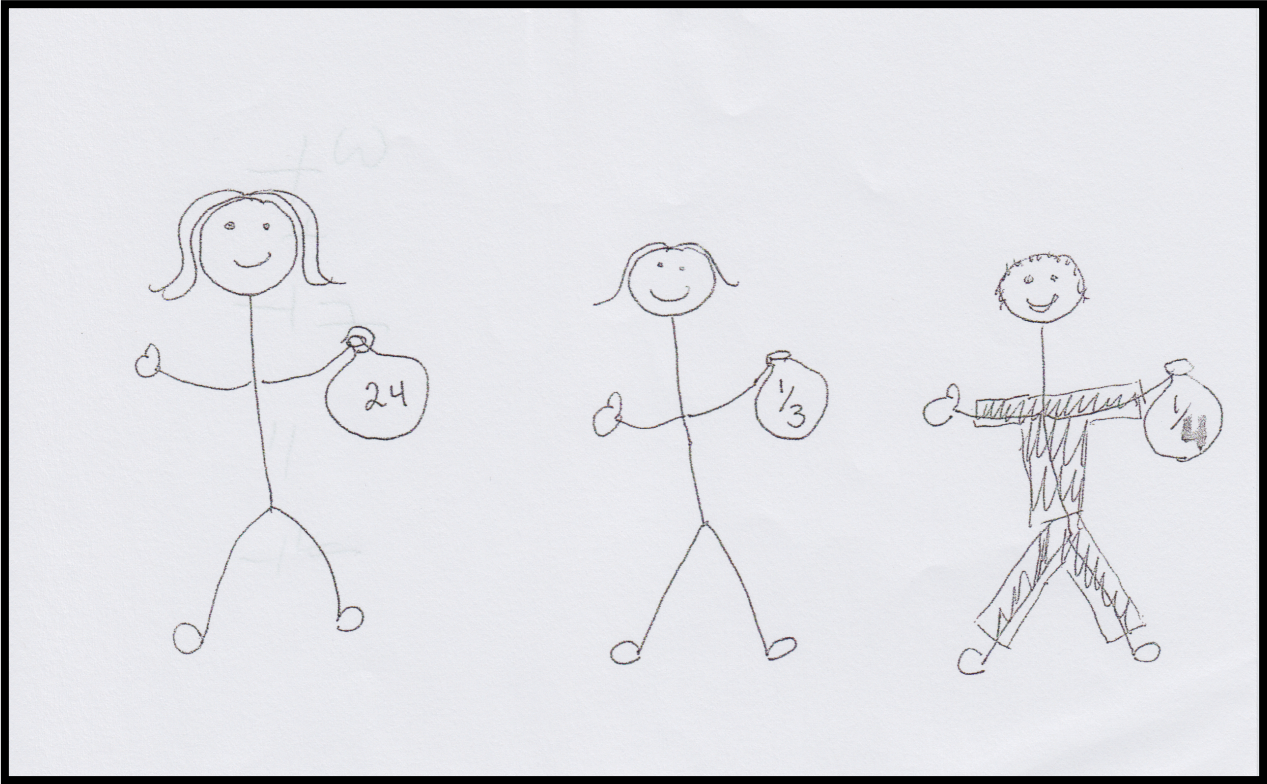


DIAGRAM F

