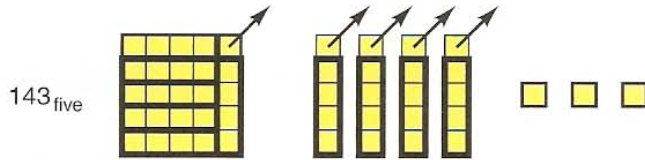
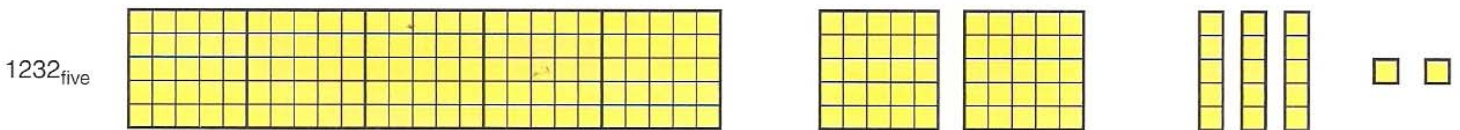


Divisibility with Multi-Base Pieces

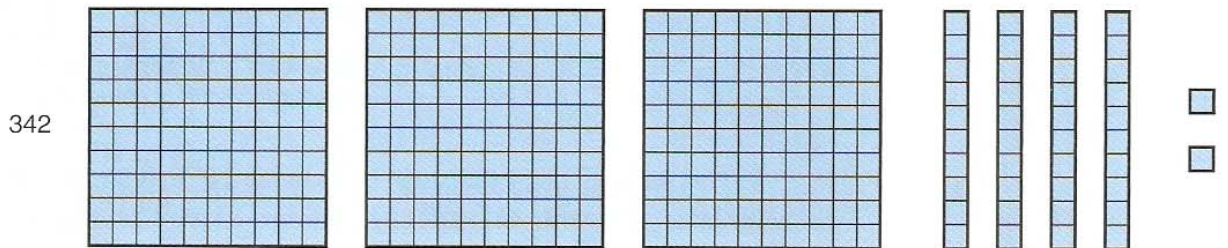
- The following diagram shows that the base-five pieces representing 143_{five} can be divided evenly into groups of 4. Each flat and long is divided into groups of 4 with 1 unit remaining (marked by arrows). The 8 remaining units (1 + 4 + 3) can be evenly divided into two groups of 4.



- Explain how the diagram above illustrates the following divisibility rule: A three-digit base-five number is divisible by 4 if the sum of its digits is divisible by 4. Form an arbitrary collection of base-five pieces to illustrate your reasoning.
- Use your base-five pieces to form the following collection. Show whether or not the divisibility rule from part *a* works for the four-digit number 1232_{five} . Write a general statement for determining when a base-five number is divisible by 4.



- Form some collections of base-ten pieces and show how divisibility by 3 and 9 in base ten is similar to divisibility by 4 in base five.



- Based on your examples, state a rule for divisibility by 3 and a rule for divisibility by 9. Draw diagrams to support your conclusions.
 - Are all base-ten numbers that are divisible by 3 also divisible by 9, and vice versa? Explain.
- Use your base-ten pieces to form the collection shown in activity 2. Look for an easy method of determining if these pieces can be evenly divided into four equal groups. Try your method on other collections of base-ten pieces. Show diagrams. Write a general statement describing a method for determining when a base-ten number can be divided by 4.