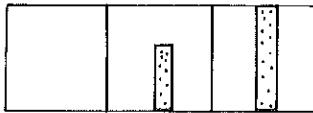# Three Bean Salads

Grade Level

TOOLS

3 types of dry "beans"
  Red beans
  Lima beans
  Black-eyed peas
**Paper plates or paper cups
 to hold small portions
  of beans**

Why

To practice working with **ratios and proportions**

▶ *The language of ratio and proportion is very important in present-day mathematics. A* **ratio** *is the numerical relation between two quantities, usually determined by dividing one of the numbers by the other and expressing the result as a fraction or a percent. For example, a business might determine its ratio of assets to liabilities by dividing the value of the assets by the value of the liabilities.*

▶ *In geometry, the ratio of the circumference of a circle to its diameter is always the number π or pi or about 3.1416.*

▶ **Proportion** *is a statement showing that two ratios are equal. For example, the ratio 1/2 is the same as the ratio 3/6 or 2/4. This is an important idea in algebra, since if any three of the numbers in a proportion are known, the fourth can be found—this is the "unknown" in algebra problems.* ◄

The following section includes fairly difficult algebra problems, which can be solved easily by trial and error using the beans.

How

☐ **All three types of beans go into each salad.**
⊓ Children should be encouraged to guess and adjust as they work. Use the beans to solve the problems.
⊔ For each salad determine how many of each of the three types of beans are needed.
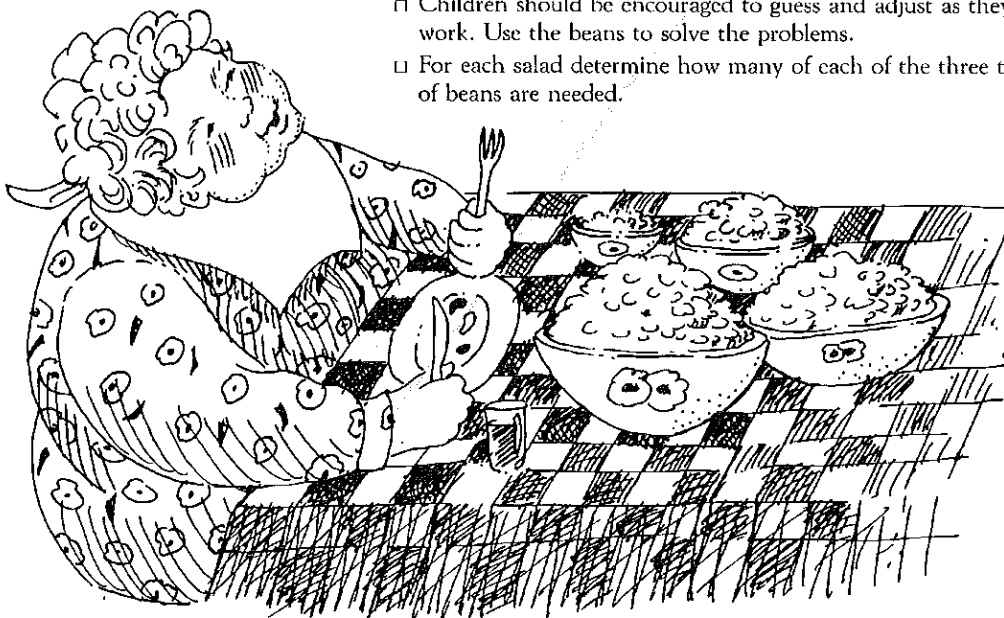
THREE BEAN SALADS

Each salad contains Red beans, Lima beans, and Black-eyed peas

1

This salad contains:

2 Lima beans

Twice as many Red beans as Lima beans

10 beans in all

2

This salad contains:

4 Red beans

1/2 as many Black-eyed peas as Red beans

10 beans in all

3

Lima beans make up 1/2 of this salad:

The salad has exactly 2 Red beans

The number of Lima beans is double the number of Red beans

4

This salad contains:

The same number of Red beans as Lima beans

3 more Black-eyes than Red beans

A total of 18 beans

5

This salad contains 12 beans

1/2 of the beans are Red

Lima beans make up 1/4 of the salad

6

This salad contains at least 12 beans

It has one more Lima bean than Red beans

It has one more Red bean than Black-eyes

7

This salad contains:

3 times as many Red beans as Black-eyes

One more Lima bean than Red beans

8 beans in all

8

This salad contains:

An equal number of Red beans and Black-eyes

5 more Lima beans than Red beans

No more than 20 beans

Make up a different salad.

Write instructions for someone else to make your salad.

Mixtures — Bean Salads and Fish Bowls (continued)

ACTIVITY 1: TWO BEAN SALADS

Work together to find out what's in each salad. Each one has two kinds of beans. Some salads may have more than one answer.

This salad has 8 beans.
Half of the beans are black.
How many are not black?

This salad has 10 beans.
4 of the beans are lima beans.
How many are red beans?

This salad has 10 beans.
It has the same number of each kind of bean.
What could be in the salad?

This salad has 4 black beans.
The number of red beans is double the number of black beans.
How many beans are in the salad?

There are 5 lima beans and 2 more red beans than lima beans.
How many red beans are there?

FAMILY MATH for Young Children
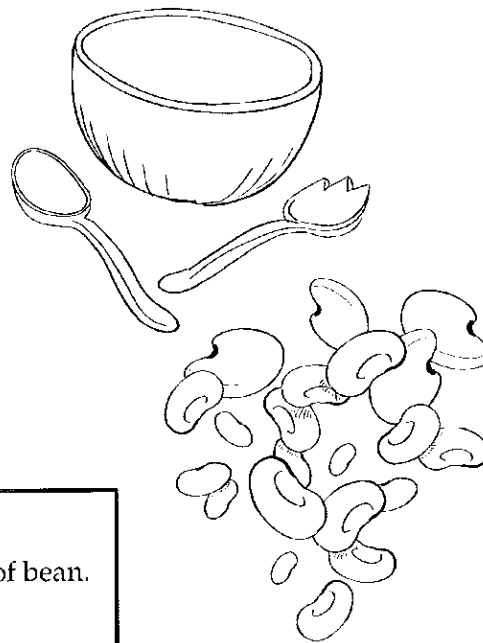
There are 5 beans in all.
There is 1 more lima bean than red beans.
How many of each kind?

There are 6 lima beans.
There are 3 more red beans than lima beans.
How many beans in the salad?

There are 6 beans in all.
There are half as many lima beans as red beans.
Describe this salad.

There are 4 beans in all.
There are three times as many black beans as red beans.
How many of each color?

There are 5 lima beans and 2 less red beans than lima beans.
How many red beans are there?
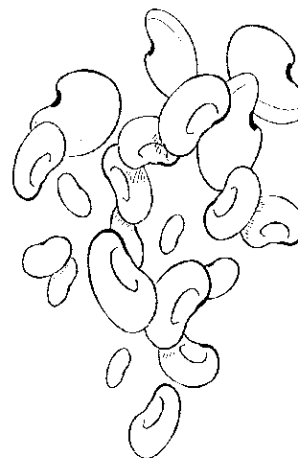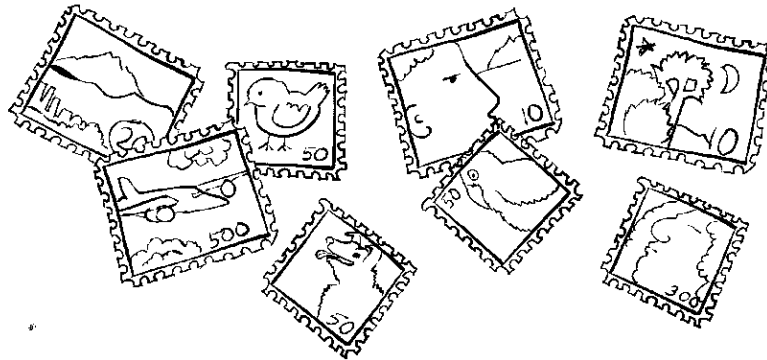
Stamps Galore!

THIS IS ABOUT

Δ   sorting

Δ   observing

Δ   adding

YOU WILL NEED

Δ   cancelled stamps

Δ   cancelled envelopes

Δ   blank sheet of paper

Δ   magnifying glass (optional)

GETTING READY

Begin a stamp collection. This can be done by recycling the stamps in your daily mail. Have your child collect them with you. You only need about ten or twelve stamps to begin.

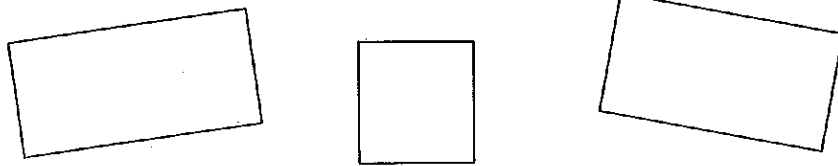If you don't receive much mail, ask friends and family to save their stamps for you.

One person asked her co-workers to save stamps for her — she received hundreds!

142

ACTIVITY

1. Invite your child to investigate stamps with you.

2. Talk about sending and receiving mail as you look at the various stamps you have collected. Where do you send mail? To whom?

3. You might compare which types of stamps you have the most of, or the least.

4. Have your child chose some stamps to put on an envelope.

5. Talk about why or how the stamps go together. Maybe they were all the same, or they all came from different countries. Maybe they all have flags on them. You decide.
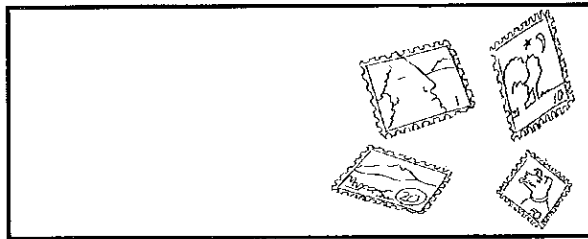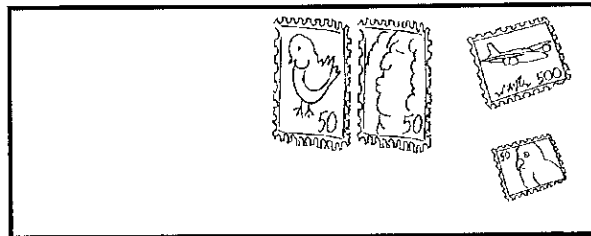
With older children, you might ask them to add the postage on the stamps.

What other ways can you organize the stamps?

Design your own FAMILY STAMP. Who is in it?

Grandpa's Coins

3-6

MATERIALS

real dimes, nickels, pennies, and quarters or play money

MATH CONNECTION

The ability to translate word phrases into algebraic expressions is crucial, not only in algebra but in almost all higher mathematics and science courses. This skill is also indispensable in economics, biology, geology, physics, and engineering.

Danielle and her brother Jordan have fun playing games with their grandfather. He has a habit of jiggling the change in his pockets when he walks. Grampa made up a game. If the children can guess the number of coins he has in his pocket, they can split the money. To help his grandchildren, he offers them some clues.

This is about
using algebraic language
to develop number sense,
proportional reasoning,
and logical thinking.

How

- Work together to help Danielle and Jordan figure out the amount and number of coins in Grampa's pockets.

- Each pocket contains at least one of each coin: penny, nickel, and dime. There may be more than one combination of coins that will work for each pocket description.

- If your child gets stuck on one problem, leave it and move on to another one. Go back later to the problem that was difficult.

- Talk about how you solved each problem and describe the strategies you used.

1. This pocket contains:
   Half as many nickels as pennies
   4 dimes
   16 coins in all

2. This pocket contains:
   Twice as many nickels as dimes
   8 nickels
   85¢ in all

3. This pocket contains:
   An equal number of nickels and pennies
   The number of dimes is a square number.[1]
   $1.08 in all

4. This pocket contains:
   Two more pennies than nickels
   The value of nickels is four times the value of the pennies.
   $1.00 in all

[1] A square number is the result (product) of a number multiplied by itself. For example, 25 is a square number, a product of 5 x 5.

Grandpa's Coins

Each of the following pockets contains at least one of each coin: penny, nickel, dime, and quarter.
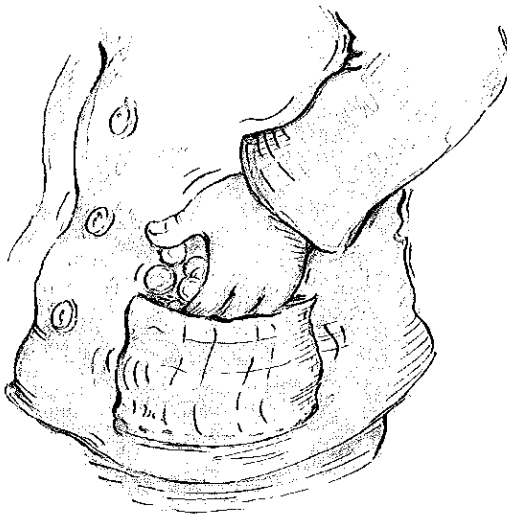
5. This pocket contains:
   The same number of dimes as nickels
   One-third of the coins are dimes.
   Five is a factor[2] of the value of each coin group.

6. This pocket contains:
   Half as many nickels as quarters
   The value of dimes and pennies together is
       half the value of quarters.
   10 coins in all

7. This pocket contains:
   A nickel for every two dimes (or a 2-to-1 ratio
       of dimes to nickels)
   The value of quarters is equal to the value
       of dimes and nickels.
   10 coins in all

8. This pocket contains:
   Three more nickels than pennies
   The value of nickels equals half the value of
       quarters and dimes together.
   The total number of quarters and dimes is
       half the number of nickels.

9. This pocket contains:
   One more nickel than pennies
   Two fewer pennies than quarters
   The total number of coins is a prime number.[3]

Here's More
- Make up your own problems. Hint: start with some coins and use them to help make up the clues.

- See Number Line Rectangles on pages 115–119 of the original *FAMILY MATH* book for more exploration of square numbers.

[2] A factor is a number that divides evenly into another number (with no remainder).

[3] A prime number is an integer bigger than 1 which has no factors besides 1 and itself. For example, 7 is a prime number because 7 and 1 are the only two whole numbers (factors) that will give you a result of 7 when multiplied.