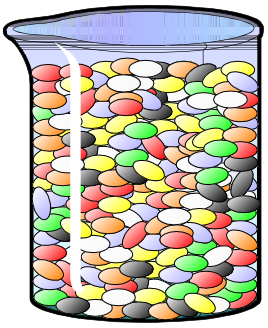
Name:_____ Date:_____

Can We Win a Jellybean Contest?

Materials needed:

•jar of dried beans or jelly beans *[Warning: don't eat your experiment!]*
•clock or watch [digital, or one with a sweep second hand]
•nickel
•5 pennies



There are many kinds of contests that a person can enter. Some require a written essay, while others (like the lottery) are won by guessing random numbers. Have you ever seen a contest in which you were asked to guess the number of jelly beans filling a big jar? If the prize were something you really wanted, like an all-expense paid vacation, how would you go about entering? Would you simply "pull a number out of a hat?" or would you go about your guess in a more scientific way? Can we use our talents at estimating to guess *other* quantities?

Introduction:

Let's say that a library has one hundred bookcases, like the one pictured to the left, filled with books. All the books are the same size. If we wanted to find out how many books there are on the shelves, we *could* count them, row after row. But if we just counted how many books there were on *one* shelf, could we figure out how many books there were all together? In the figure to the left, count the number of books on each shelf. There are 3 shelves in the bookcase. We can use multiplication to calculate the exact number of books:

$$Total = (\text{Number of books on 1 shelf}) \times 3$$

How many books are there in the bookcase? _____

Now *count* the total number of books in the bookcase. Is your calculation equal to your observation? _____

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If there are 100 bookcases in the library, how many books are there in total?
How did you figure this out?

Is there any other way to figure out the total number of books in the library? Describe at least one other method here:

Part I: Estimating a number

A. Record the number of beans you *think* are in the jar. (Guess!)

B. Hold the jar above you, so that you can count how many beans touch the bottom of the jar. Record your data.

C. Try to count approximately how many beans fit in a straight line from top to bottom along the side of the jar. Record your data.

D. How can you use your data to find an estimate?
[Hint: Think about the procedure you used to calculate the number of books on the shelves.] Use the space to below to *estimate* your conclusion.

E. What did your calculations conclude? How many beans do you *now* think there are in the jar, and why?

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F. Ask your classmates what their results were. How does your estimate compare? Write down at least five classmates' results, and if their results are different from yours, describe why.

Name	Number	Difference in reults (if any) may be due to:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

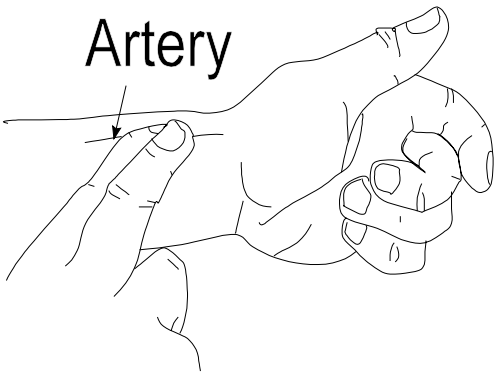
G. Ask your teacher if he/she knows the number of beans in the jar. If so, was your first guess (Procedure "A") or your second guess (Procedures B, C and D) closer to the true number?

Part II: Estimating time

H. While a classmate watches a clock or a watch, estimate how long you think it takes for one minute to pass. Record how much time actually went by, when you thought one minute had passed.

I. How many seconds are there in one minute? How many seconds away from one minute was your estimate?

_____ , _____



J. It's difficult to measure time without a watch, but there *is* a way that you can *estimate* one minute of time. Your heart is currently beating at a fairly constant rate. While seated, count how many times your heart beats while your partner measures one minute. To find your pulse, touch your index and middle fingers to your opposite wrist. Write your pulse rate per minute in the space provided:

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K. Now, try to measure *two minutes* of time, using only your pulse. Have your classmate use a watch to measure the time exactly. When *you* think two minutes have gone by, record how much time *actually passed* in the space provided:

L. How many seconds off were you?

Part III: Estimating mass

M. Guess the mass of a penny in grams. (Take a wild guess!)

N. The mass of a nickel is 5 grams. Decide how many pennies have the same mass as one nickel. What is your estimate?

O. Using your estimate in Procedure "N," what do you guess is the mass of a penny?

Questions:

1. a. What was the difference between your first and second estimates in Part I?
   b. What was the difference between your first and second estimates in Part II?
   c. What was the difference between your first and second estimates in Part III?

a.
b.
c.

2. Which estimates were closest to the correct values: your first ones, or your second ones? Why?

Conclusion:

How can you improve the accuracy of your estimates?