

Project 5 - LET'S MAKE A DEAL USING A PROBABILITY SIMULATION

Introduction: In the popular game show, "Let's Make a Deal", contestants are sometimes given the choice of three curtains, a valuable prize behind one of the curtains and undesirable prizes behind the remaining two curtains. Often, after a curtain is selected, a different curtain is opened to reveal a somewhat undesirable prize. The contestant is then given the opportunity to switch curtains. Should the contestant switch to the other curtain? Or, does it even make a difference? You will be able to answer these questions after completing this project. The answers may surprise you!

Procedure:

1. You will need someone to assist you with this simulation. Find someone who will spend approximately 45 minutes to help you with this project.
2. In this project, you will simulate the game show described above by using three identical cardboard squares with the numbers 1, 2 and 3 written on the backs of the cards. These cards will function as the "curtains" in this simulated game show. Cut out a piece of paper that is smaller than the cardboard squares and write the word "prize" on it. This will function as the "grand prize" in this simulation.
3. With the person who has agreed to help, decide which of you will play the role of "game show host" and which of you will be the "contestant". The game show host should place the small piece of paper labeled "prize" under one of the cards. Make sure that the contestant does not see where the "prize" card has been placed. The contestant will choose one of the cards. Then, the host lifts up one of the cards with no prize under it, and allows the contestant to switch their choice. In this part of this simulation, the contestant should **always switch** choices. Repeat this game 30 times, and record how many times the contestant wins the "prize".

Example: The host places the prize under card #2. The contestant chooses card #1. The host lifts up card #3 to show that there is no prize. In this part of this simulation, the contestant switches to card #2 and wins.

NUMBER OF WINS _____ NUMBER OF LOSSES _____

4. Repeat step 3, except this time, the contestant should **never switch** choices after one of the cards is turned up. Repeat this simulation 30 times and record how many times the contestant wins the prize.

NUMBER OF WINS _____ NUMBER OF LOSSES _____



4. Calculate the approximate cost of the ingredients for this spaghetti dinner by doing the following:
- a. Write each ingredient amount in terms of the amounts you would purchase. You will have to estimate for some of the ingredients. Fill in these amounts in the table given on the following page.

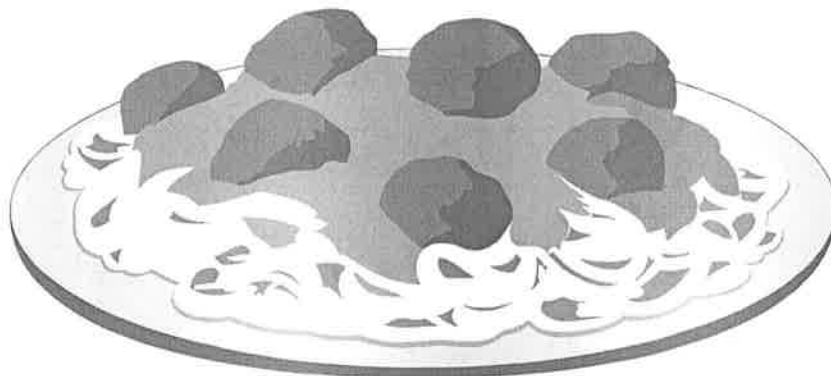
Example: 25 tablespoons of oregano is equal to about 5 containers of oregano.

- b. Calculate the cost of each ingredient. You may have to make a trip to the grocery store to obtain the prices. Write these costs in the table given on the following page.

Example: 5 containers of oregano at \$2.55 per container results in a cost of $5 \times \$2.55 = \12.75 .

- c. Add up all the costs.

CALCULATIONS



| CALCULATION OF INGREDIENT COSTS | | |
|---------------------------------|--------------------------------------|-------------------------------|
| NAME OF INGREDIENT | AMOUNT OF INGREDIENT TO PURCHASE | TOTAL COST OF THIS INGREDIENT |
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| | | |
| | TOTAL COST OF ALL INGREDIENTS | |

5. Calculate the cost per person by dividing your total cost by 150.

CALCULATIONS

COST PER PERSON \$ _____



Project 20 - HOW MUCH DOES IT COST TO PAINT YOUR LIVING ROOM?

Introduction: When we hire someone to paint our house, the cost can range from \$500 to several thousand dollars. The paint is inexpensive, but the labor required is costly. In this project you will play the role of a painting contractor, and prepare a price estimate of the cost to paint your own living room. In order to prepare this price estimate, you will need to measure the surface area, estimate the amount of paint required, and estimate the number of hours required to paint your living room.

Procedure:

1. First, you will need to calculate the total number of square feet that you will be painting. Measure each rectangular region that is to be painted and obtain the length and width in feet. Multiply the length (ft) times the width (ft) to obtain the square feet of each rectangular region. Do not include areas that are not painted such as doorways or windows. Remember to take all measurements in feet.

Example: Starting from the front door you measure $10 \frac{1}{2}$ feet to the corner. You measure the height of your walls to be 8 feet. The square feet in this region are $8 \text{ ft} \times 10 \frac{1}{2} \text{ ft} = 84$ square feet. Then, proceed to measure all of the rectangular regions of your living room walls.

CALCULATIONS

2. Add all of the square feet calculated in step 1. Record this figure.

TOTAL SQUARE FEET _____

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3. Select a brand of paint that you would use if you were to actually paint your living room. Note what the price per gallon is, and how many square feet each gallon covers. You will use these two figures in calculating your estimate.

PRICE PER GALLON \$ _____

SQUARE FEET COVERED PER GALLON _____

4. Using your total square feet calculated and the number of square feet each gallon covers, calculate how many gallons would be required to paint your living room. Then, calculate how many gallons would be required to apply two coats.

Example: If each gallon covers 500 square feet, and you are painting 900 total square feet, the number of gallons required would be $900 \div 500 = 1.8$ gallons. To apply two coats, 3.6 gallons would be required. Since you cannot purchase partial gallons, 3.6 gallons would be rounded up to 4 gallons.

CALCULATIONS

GALLONS REQUIRED FOR TWO COATS _____

5. Calculate the cost of the paint you would use to apply two coats.

COST OF PAINT \$ _____

6. Estimate the approximate total time that it would take you to paint your living room. Then, think of an hourly rate you would charge if you were the painting contractor. Using this rate, calculate the cost of labor.

Example: If you estimated that it would take you 10 total hours to paint your living room, and your hourly rate is \$20 per hour, then the cost of labor would be $10 \times \$20 = \200 .

ESTIMATED TOTAL HOURS OF LABOR _____

HOURLY LABOR RATE \$ _____

COST OF LABOR \$ _____

7. Prepare an estimate for this painting job by listing the total square feet, the total paint required, the type of paint, the total cost of paint, the hours of labor, the total cost of labor, and the total cost.

ESTIMATE

_____ **TOTAL SQUARE FEET**

_____ **TOTAL PAINT REQUIRED**

_____ **TYPE OF PAINT**

\$ _____ **TOTAL COST OF PAINT**

\$ _____ **TOTAL COST OF LABOR**

\$ _____ **TOTAL COST**



8. What are at least three additional costs to you, the contractor, besides the cost of the paint? Describe them.
