

“Pay The Rent” on *The Price is
Right*

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Rules

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Example



Our Calculations

- “Pay the Rent” should be played with 3 main assumptions

$$P(\text{Guessing least, 2nd, and most expensive correct}) = \frac{1}{C(6,3)} = \frac{1}{\frac{6!}{3!3!}} = \frac{1}{\frac{6*5*4}{3*2*1}} = \frac{1}{20}$$



$$P(\text{Guessing the correct floor for least and 2nd most expensive}) = \frac{1}{C(2,1)} = \frac{1}{2}$$



$$P(\text{Placing final three items correctly}) = \frac{1}{C(3,2)} * 2.44 = \frac{1}{3} * 2.44 = \frac{2.44}{3}$$



$$P(\text{Winning \$100,000}) = \frac{1}{20} * \frac{1}{2} * \frac{2.44}{3} = 2.03\%$$

Ideal Strategy to Place Items

1. Construct an 80% confidence interval for the price of each item and identify the most expensive item, the second-most expensive item, and the least expensive item
2. Place the most expensive item in the attic of the house and pair second most expensive item with the least expensive item
3. Mentally play around with different combinations of where to place the remaining items and which row to place the least expensive item and second most expensive item on

Ideal Strategy as Prices are Revealed

Based on averages we calculated from the games we watched, do not risk \$10,000 for \$100,000 if:

- The price of item in the mailbox is not between 26.5% and 56.5% of the predicted price of the most expensive item
- The combined price of the items in the first floor is not between 75% and 90% of the predicted price of the most expensive item
- The combined price of the items in the second floor is not between 86% and 96% of the predicted price of the most expensive item

If the mailbox's total price or the first floor's total price is not within its expected interval, consider going for the following floor on a case-by-case basis.

How Our Strategy Improves Real-Life Contestants' Strategies

- Most contestants on the show put what they think is the least expensive item in the mailbox - this is not optimal
 - Instead, reserve the lowest price to combine with a higher price on a middle level
- Our strategy far reduces the number of combinations of prices a contestant could try
- Provides useful guidelines for starting the game (trying to guess the first, second, and sixth prices, rather than needing to get them all right), as well as for continuing throughout the game and where to stop if things aren't going to plan

Other Topics That Could Be Explored Further

- Calculating the probability of winning on each level of the house (winning the \$1,000, the \$5,000, and the \$10,000, not only the \$100,000 or nothing)
 - Would allow many more possible combinations, which would be complicated to calculate for each level for each of the games we watched
- Calculating the expected value of the game using these probabilities
- More detailed consideration of the third, fourth, and fifth most expensive prizes and how to place them/ more consideration of how to win outside of focusing on the first, second, and sixth most expensive
 - Would be less realistic based on our viewings, as we averaged about three out of six prizes correctly guessed; the placement of third, fourth, and fifth in the winning combinations was also more random than the sixth and second
- Change in the structure of the game from pre-2021 playings