

Expected Value

$$\begin{aligned} \text{expected value} &= (\text{value})(\text{probability of outcome 1}) \\ &+ (\text{value})(\text{probability of outcome 2}) \\ &+ (\text{value})(\text{probability of outcome 3}) \\ &\dots \end{aligned}$$

The number of household members, x , living in Raleigh homes has the following probability distribution:

value	x	1	2	3	4	5	6	7	8
prob	$P(x)$	0.21	0.28	0.16	0.22	0.06	0.04	0.02	0.01

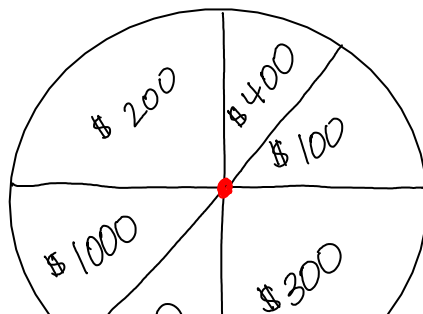
$$1(.21) + 2(.28) + 3(.16) + 4(.22) + 5(.06) + 6(.04) + 7(.02) + 8(.01) = 2.89$$

Expected household size is 2.89 people.

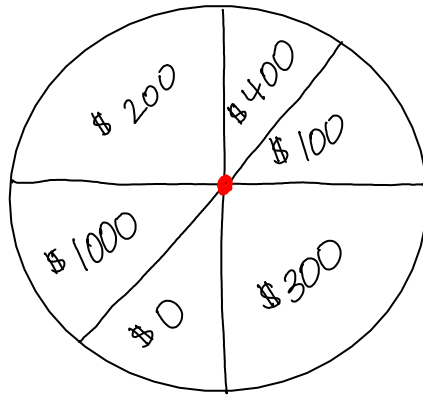
You pay \$10 to play a high-stakes dice game. If you roll a 1, 2, or 3, you lose. If you roll a 4 or 5, you win \$20. If you roll a 6, you win \$30. What is the expected value?

outcome	Prize	Payout	Probability
1	0	-10	$\frac{1}{6}$
2	0	-10	$\frac{1}{6}$
3	0	-10	$\frac{1}{6}$
4	20	10	$\frac{1}{6}$
5	20	10	$\frac{1}{6}$
6	30	20	$\frac{1}{6}$

EV = \$1.67



value	Probability
200	$\frac{1}{4}$
1000	$\frac{1}{8}$
0	$\frac{1}{8}$
300	$\frac{1}{4}$
100	$\frac{1}{8}$
400	$\frac{1}{8}$



Value	Probability
200	$\frac{1}{4}$
1000	$\frac{1}{8}$
0	$\frac{1}{8}$
300	$\frac{1}{4}$
100	$\frac{1}{8}$
400	$\frac{1}{8}$

$$EV = \$312.50$$

Linda estimates the number of question she answered correctly on a test. She answered 10 correctly with a probability of 0.6, 20 correctly with a probability of 0.3, and 50 correctly with a probability of 0.1. What is the expected value of the number of questions she answered correctly?

$$10(.6) + 20(.3) + 50(.1) \quad EV=17$$