

4.3: Expected Value










Group Activity



Beginning in October, 2015, Powerball® became an even larger combined large jackpot game and cash game. Every Wednesday and Saturday night at 10:59 p.m. Eastern Time, we draw five white balls out of a drum with 69 balls and one red ball out of a drum with 26 red balls.

Source: http://www.powerball.com/powerball/pb_prizes.asp

Powerball - Prizes and Odds

Match	Prize	Odds
	Grand Prize	1 in 292,201,338.00
	\$1,000,000	1 in 11,688,053.52
	\$50,000	1 in 913,129.18
	\$100	1 in 36,525.17
	\$100	1 in 14,494.11
	\$7	1 in 579.76
	\$7	1 in 701.33
	\$4	1 in 91.98
	\$4	1 in 38.32

The overall odds of winning a prize are 1 in 24.87.
 The odds presented here are based on a \$2 play (rounded to two decimal places).

1.a. If the current Powerball grand prize amount is \$90 million, calculate the expected winnings per ticket:

b. Calculate the expected profit or loss for the ticket-holder per Powerball ticket:

2. a. Calculate the expected value of the Subway prize wheel from activity 7A,B. Let's say the mystery prize is a \$20 gift card.

	Sub	Drink	Cookies	Chips	BOGO	Mystery Prize
Prize Value	\$4.25	\$1.60	\$1.30	\$0.99	\$4.25	
Probability	$\frac{2}{13}$	$\frac{2}{13}$	$\frac{2}{13}$	$\frac{4}{13}$	$\frac{2}{13}$	$\frac{1}{13}$



b. What does the expected value mean in this example? Explain it in a complete sentence.

3. Based on historical data, an auto insurance company estimates that a particular customer has a 1.5% likelihood of having an accident in the next year, with the average insurance payout being \$10,000.

If the company charges this customer an annual premium of \$500, what is the company's expected value of this insurance policy?

a. Make a probability table.

Possibilities	Accident	No Accident
Payout		
Probability		

b. Calculate the expected value for the company.

4. A company estimates that 7% of their products will fail after the original warranty period but within 2 years of the purchase, with a replacement cost of \$250.

If they want to offer a 2-year extended warranty, what price should they charge so that they'll break even (in other words, so the expected value will be 0)

a. Make a probability table.

b. Calculate the expected value and answer the question.