Additional Exercises on Expectation

1. In a proposed business venture Nicole estimates there is a 65% chance she will make $60,000 and a 35% chance she will lose $30,000. Determine Nicole’s expectation.

2. Tamra, an investment counselor, is advising her client on a particular investment. She estimates that if the tax law does not change, the client will make $10,000 but if the tax law changes, the client will lose $3,000. Find the client’s expectation if there is a 70% chance that the tax law will change.

3. Freddie and Katherine play the following game: Freddie picks a card from a deck of cards. If he selects a heart, Katherine gives him $5. If not, he gives Katherine $3.
   a) Determine Freddie’s expectation.
   b) Determine Katherine’s expectation.

4. One thousand raffle tickets are sold for $1 each. One prize of $500 is to be awarded.
   a) Elizabeth purchases one ticket. Determine her expectation.
   b) If the vendor sells all 1000 tickets, how much profit will s/he make?

5. Ten thousand raffle tickets are sold for $5 each. Four prizes will be awarded. First prize is $10,000, second prize is $5000, and there are two third prizes, each for $1000. Andrew purchases one of these tickets.
   a) Determine his expectation.
   b) Explain the meaning of your answer to part a).

6. It will cost an oil drilling company $30,000 to sink a test well. If it hits oil, the company will make a net profit of $600,000. If it hits natural gas, the net profit will be $100,000. If it hits nothing, it will lose the initial investment of $30,000. The probability of hitting oil is 0.08 and the probability of hitting gas is 0.20.
   a) What is the expectation of the oil drilling company?
   b) Based on your answer to part a) should the company sink the test well? Explain why or why not.

7. Robert is considering bringing a lawsuit against a chemical company. His lawyer estimates that there is a 35% chance he will make $40,000 (after legal fees), a 10% chance he will break even (the award will equal the legal fees), and a 55% chance he will lose in which case Robert will need to pay $30,000 in legal fees.
   a) Determine Robert’s expectation if he proceeds with the lawsuit.
   b) Based on your answer to part a) should Robert proceed with the lawsuit. Explain why or why not.
Answers

1. $28,500

2. $900

3. 
   a. –$1
   b. +$1

4. 
   a. –50 cents
   b. $500

5. 
   a. –$3.30
   b. This means that if Andrew were to play this type of raffle many, many times, he would have an average loss per play of $3.30.

6. 
   a. $46,400
   b. Yes, because the company’s expectation is positive.

7. 
   a. –$2,500
   b. No, because Robert’s expectation is negative.