Lesson Four – Expected Value Worksheet

1. Consider the following game. It costs $1.00 every time you toss 2 coins. If the coins both land heads, you receive $5.00. If the coins land in any other way, you receive nothing.

   a) Find the expected value of the game.

   b) Is it financially a good idea to play this game?

   c) If you play this game 20 times, how much would you expect to win or lose?

   d) Suppose you were to receive $4.00 if the coins both landed heads. Find the expected value of this revised game.

   e) Is it financially a good idea to play this revised game?

2. A carnival operator runs a coin toss game where the probability of winning is 1 in 150. If a participant wins, he or she wins a stuffed animal worth $15.

   a) If the operator charges 25 cents a toss, what is the expected gain of the game?

   b) If the operator charges 15 cents a toss, what is the expected gain of the game?

   c) If the operator charges 10 cents a toss, what is the expected gain of the game?

3. A community centre runs the following game at an annual fund raising event. In this game, marbles are randomly picked from a bag. The bag contains 4 red marbles, 3 white marbles and 1 black marble. If the marble picked is black you win $5.00. If it is white you win $2.00 while if it is red you win nothing. The game costs $2.00 to play.

   a) Determine the expected value of the game.

   b) If you play this game 10 times, how much would you expect to win or lose?

   c) The community centre expects 2 000 people to play this game. How much does it expect to win or lose from this game?

4. A charity holds the following fund raising event. A participant pays $1 to pick a duck out of a duck pond. If the duck has a sticker on it, the participant wins $10. There are 500 ducks in the pond with 25 having stickers on them.

   a) Determine the expected value of the event.

   b) If you pick 10 ducks out of the pond, how much would you expect to gain or lose?

   c) If all the ducks are picked from the pond, how much will the charity gain or lose?

5. Consider the following game. It costs $2.00 each time you play. You have a 2 in 5 chance of winning the game and a 3 in 5 chance of losing. If you win the game, you receive $4.00. If you lose the game, you receive nothing. Find the expected value of the game.

6. Consider the following game. It costs $3.00 each time you play. You have a 1 in 10 chance of winning $20.00, a 1 in 5 chance of winning $5 and a 7 in 10 chance of receiving nothing. Find the expected value of the game.

7. Consider the following game. It costs $3.00 each time you roll a 6 sided die. If you roll a 6 you win $15.00. If you roll any other number, you receive nothing.

   a) Find the expected value of the game.

   b) If you play this game many times, will you gain or lose money?

8. Consider the following game. It costs $2.00 each time you draw a card from a shuffled deck. If you draw a diamond you win $10.00. If you draw any other card, you receive nothing.

   a) Find the expected value of the game.

   b) If you play this game many times, will you gain or lose money?

Answers:

1. a) $0.25 b) yes c) $5.00 d) 0 e) Break Even
2. a) -$0.15 b) -$0.05 c) 0
3. a) -$0.63 b) Loss $6.30 c) $1 260 gain
4. a) -$0.50 b) $5.00 Loss c) $250 gain
5. -$0.40
6. 0
7. a) -$0.50 b) lose money
8. a) $0.50 b) gain
9. a) -$0.25 b) lose money
10. a) -$1.15 b) lose money