Lesson 10-7

Example 1

BUSINESS Mr. Hirsch, the owner of a window treatment company bids on providing all the window shades for a bank. He estimates that the probability that he will get the contract and make a profit of $12,000 is 0.3, while the probability that he will not get the contract and will lose $500 due to the costs of preparing and presenting his bid is 0.7. Mr. Hirsch thinks that on average, he will make over $3500. Is he correct?

Solution

The sample space is separated into two events: making $12,000 and losing $500. Use a negative sing for the amount lost or spent.

Expected Value	=	Probability of Event	·	Payoff of Event	+	Probability of Event	·	Payoff of Event
E	=	0.3	·	$12,000	+	0.7	·	-$500

E = $3600 + (-$350) =$3250

He is not correct since the expected value is less than $3500.

Example 2

FUND RAISING A high school band is holding a raffle as a fund raiser for new uniforms. They expect to sell 1200 raffle tickets. The table shows the values of the prizes to be awarded and the value of each prize.

Value of Prize		Probability of Winning
First	$250	1 out of 1200
Second	100	1 out of 1200
Third	50	3 out of 1200
Fourth	25	5 out of 1200
Fifth	10	10 out of 1200

Find the expected amount won for this raffle per ticket. Round your final answer to the nearest cent.

Solution

There are 5 events in the sample space, so there must be 5 terms in the formula.

$$E = 1\frac{1}{1200} \cdot \$2502 + 1\frac{1}{1200} \cdot \$1002 + 1\frac{3}{1200} \cdot \$502 + 1\frac{5}{1200} \cdot \$252 + 1\frac{10}{1200} \cdot \$102$$

E □ $0.60

The expected amount won in this raffle is about $0.60 or 60 cents per ticket.

Example 3

Find the expected value to determine whether the game described is fair.

Two children play a board game with a number cube. A player who rolls a multiple of 3 gets to advance 2 spaces on the board. A player who rolls a number that is not a multiple of 3 must move backward 1 space on the board.

Solution

Two of the numbers on the cube are multiples of 3: 3 and 6.
Four of the numbers are not multiples of 3: 1, 2, 4, and 5.

$$E = 1\frac{2}{6} \cdot 22 + 1\frac{4}{6} \cdot (-1)2 \qquad E = (P(\text{multiple of 3}) \cdot 2) + (P(\text{not multiple of 3}) \cdot (-1))$$

$$E = \frac{4}{6} - \frac{4}{6}$$

The game is fair since the expected value is 0.