

$$E.V. = P(\text{win}) \times \$\text{gain} - P(\text{lose}) \times \$\text{loss}$$

Example 2

A school is looking to have a fundraising activity at their school opening barbeque in September. They are going to have a spinner that is split into 10 equal sections. ^{(win) $\frac{2}{10}$} Two of the sections say "WIN", and the other eight sections say "LOSE". A person can spin the spinner for \$2. If the spinner lands on a "WIN" section, the person wins \$15.

- a) Calculate the expected value for a person spinning the spinner.

$$EV = P(\text{win}) \times \$\text{gain} - P(\text{lose}) \times \$\text{loss}$$

$$EV = \left(\frac{2}{10} \times 13\right) - \left(\frac{8}{10} \times 2\right)$$

$$EV = (2.6) - (1.6) \Rightarrow \$1.00 \text{ gain}$$

The person is expected to win \$1.00 per game.

- b) Do you think that this game is going to help the school raise money? Explain your answer making reference to the expected value you calculated in part a).

No. The school will lose \$1.00 every time a person plays the game.

The person playing the game has a positive expected value.

$$P(\text{win}) = \frac{2}{10}$$

$$\$ \text{gain} = 15 - 2 = 13$$

$$P(\text{lose}) = \frac{8}{10}$$

$$\$ \text{loss} = 2$$

Example 3

You just bought a raffle ticket for \$10. Any individual ticket has a 0.1% chance of winning a trip worth \$8000. A ticket also has a 5% chance of winning a \$35 grocery store gift card.

- a) Calculate the expected value of one ticket in this raffle.

$$E.V. = P(\text{win}) \times \$\text{gain} + P(\text{win}) \times \$\text{gain} - \$\text{loss}$$

$$EV = (0.001 \times 8000) + (0.05 \times 35) - 10$$

$$EV = 8 + 1.75 - 10 = 9.75 - 10 \Rightarrow \underline{\underline{-\$0.25}}$$

A loss of \$0.25 per ticket

- b) What is the expected value if you buy 7 tickets in this raffle?

$$\text{Expected Value (7 tickets)} = E.V. \text{ for 1 ticket} \times \# \text{ of tickets}$$

$$= -0.25 \times 7$$

$$= -\$1.75$$

A loss of \$1.75 for 7 tickets

$P(\text{win})$ change to decimal by $\div 100$

$$P(\text{win}) = 0.1 \div 100 = 0.001$$

$$\$ \text{gain} = 8000$$

$$P(\text{win}) = 5 \div 100 = 0.05$$

$$\$ \text{gain} = 35$$

$$\$ \text{loss} = 10$$