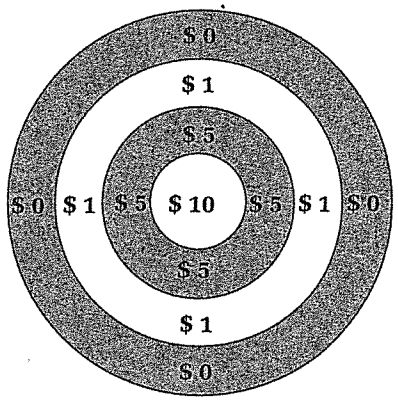
1. Six months after starting their service contract program, an examination of SoundTech's service records shows that customers with service contracts bring their CD players in for service at a higher rate than those customers who did not buy a service contract. In fact, 3% of the CD players covered by a service contract needed replacement and 4.5% needed repair. What is the expected value, to the nearest cent, of the service contract now?

A fair die is tossed. You win 10 cents per dot for even numbers but lose 10 cents per dot for odd numbers.

2. Make a table showing each possible outcome, its probability, and its gain or loss.
3. Calculate the expected value of the game.
4. Is this a fair game? If not, who is favored, the player or the person running the game?

A game is played by tossing a single dart at a target like the one shown at the right. The player wins the amount in the region where the dart lands. The rings are 0.5 ft wide and the radius of the center circle is also 0.5 ft. Assume that the dart always hits the target. Players pay $2 per dart to play the game. Use this information for Exercises 5–7.



5. Find the area of each of the rings and the area of the center circle. Leave your answers in terms of π.
6. Find the probability that a dart lands in each of the four regions by dividing its area by the area of the entire target (the outer circle).
7. Find the expected value of this game, including the $2 cost to play. Is this a fair game? If not, what price would make it fair?

In actual *Monopoly*™ play, you must consider other factors when you decide whether to stay in jail or buy your way out. For example, being in jail is a disadvantage early in the game because you may miss the opportunities to buy property. Suppose you land in jail at a time when you estimate that each turn spent in jail will eventually cost you $500 in lost rental income.

11. Complete this table of the possible outcomes, their probabilities, and their payoffs.

Outcome	Probability	Cost
Doubles on 1st turn	?	$0
Doubles on 2nd turn	$\left(\frac{5}{6}\right)\left(\frac{1}{6}\right) = \frac{5}{36}$	$500
Doubles on 3rd turn	?	?
No doubles	?	? + $50

12. Calculate your expected value (cost), to the nearest dollar, in this situation. Should you pay $50 to get out of jail on your first turn?

13. A television production company is considering whether to produce a pilot for a television series. It will cost the company $300,000 to make the pilot. It is estimated that there is a 2% chance that a network will decide to produce the series, which would mean a profit of $1 million to the production company. There is a 30% chance that the network will buy only the pilot for $500,000. Based on expected value, what should the company decide?

A contestant on a game show has won prizes worth $16,000 and is invited to trade them in for a chance to pick one of three curtains. Behind one curtain are prizes worth $60,000, behind another curtain are prizes worth $10,000, and behind the third curtain are gag prizes worth nothing.

14. Design a simulation in which 20 people are each in the same situation as this contestant and decide to go for the curtain. Keep track of the results.

15. In your simulation, what is the contestant's average gain or loss? Remember that each contestant "pays" $16,000 in prizes to choose a curtain.

16. Calculate the expected value, to the nearest dollar, for choosing a curtain. Compare the answer to your result for Exercise 15.