

1. A \$20 bill, two \$10 bills, three \$5 bills and four \$1 bills are placed in a bag. If a bill is chosen at random, what is the expected value for the amount chosen?

2. A dice game involves rolling 2 dice. If you roll a 2, 3, 4, 10, 11, or a 12 you win \$5. If you roll a 5, 6, 7, 8, or 9 you lose \$5. Find the expected value for the game. Find the probability of rolling the sums first.

3.

d. Expected value can be used to help price insurance. For example, suppose that a company insures people against being struck by lightning and expects to sell 3,100,000 policies. The probability of being struck by



lightning in a year is $\frac{1}{775,000}$. (Source: www.lightningsafety.noaa.gov/odds.htm) If an insured person is struck by lightning, the company would pay them \$1,000,000. What is the expected number of insured people who will be struck by lightning? What is the expected total payout to them? What should the company charge each insured person per year (called a *premium*) in order to expect to break even?

4. In a proposed business venture, a company estimates that there is a 60% probability that it will make \$95,000, a 20% probability that it will break even and a 20% probability that it will lose \$65,000. How much can the company expect to gain or lose?

5. The Bonus Lotto game described below is similar to those played in many states. The jackpot starts at \$4,000,000. On Saturday, six numbers from 1 through 47 are drawn. A seventh number, called the Bonus Ball, is then drawn from the remaining numbers. A player wins if the six numbers he or she selects match at least two of the numbers drawn and the Bonus Ball.

The probabilities of winning various prizes are given in the following table.

Match	Winnings	Probability
6 of 6	\$4,000,000	$\frac{1}{10,737,573}$
5 of 6 + bonus ball	\$50,000	$\frac{1}{1,789,595}$
4 of 6 + bonus ball	\$1,000	$\frac{1}{17,896}$
3 of 6 + bonus ball	\$100	$\frac{1}{688}$
2 of 6 + bonus ball	\$4	$\frac{1}{72}$
Other	0	

- What is the probability of winning nothing? Write your answer in decimal form.
- What would be a fair price to pay for a ticket?
- Bonus Lotto costs \$2 to play. How much does the state expect to earn on every 1,000,000 tickets sold?

6.

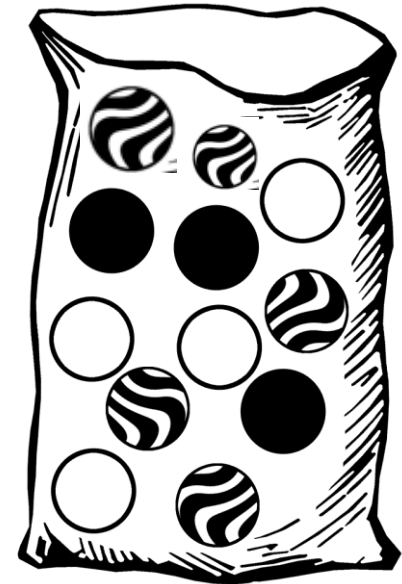
If there is a 40% chance of rain today, it means that it rained on 40% of the days in the past that had weather conditions similar to those today.

- a. On 14 different days, the weather report says there is a 40% chance of rain. What is the expected number of rainy days out of the 14? What is the expected number of days without rain?
- b. On 20 different days, the weather report says there is a 50% chance of rain. It actually rained on 9 of those days. Do you think the meteorologist did a good job of predicting rain? Explain.

7. You are going to draw a marble out of a bag. If you draw black you get \$5, if you draw white you get \$1, if you draw a striped you do not win anything.

a. Find the expected value.

b. Is \$2.00 a fair price to play?



8.

The average claim for collision damage to a fairly new car involved in a collision is about \$4,047. For every 100 fairly new cars that are insured, each year, there are about 7.0 collisions in which a claim is filed.

(**Source:** Highway Loss Data Institute, www.iihs.org)

- a. For every 100 fairly new cars that are insured, what is the expected amount of money to be paid out to insurance claims for collision damage?
- b. What is the fair price to charge for collision insurance for one year for a fairly new car?

9. The prizes in a raffle are four \$20 gift certificates to a local restaurant, two weekend getaways each worth \$550, and the grand prize of a trip to Washington, D.C. worth \$2,800. Exactly 2,000 raffle tickets will be sold.

- a. If you buy one raffle ticket, what is the probability that you will win a weekend getaway?

- b. What is the fair price to charge for one raffle ticket?
Show your work.

10. The Taylor Art Association is planning to have a fundraiser each month at their monthly art show. People will pay to spin the spinner below and will win a gift certificate with the indicated value.

a. Complete the **probability distribution** table (at right) for the outcome of one spin.



b. If the Art Association charges \$20 for one spin, should they expect to **make money, lose money, or break even over the long run**? Show your work or explain your reasoning.

Prize Value	Probability	Expected Value
\$5		
\$10		
\$25		
\$50		
Total		