

- ___ 1. Insurance company records indicate that 12% of all teenage drivers have been ticketed for speeding and 9% for going through a red light. If 4% have been ticketed for both, what is the probability that a teenage driver has been issued a ticket for speeding but not for running a red light?
 A) 3% B) 8% C) 12% D) 13% E) 17%

- ___ 2. Which two events are most likely to be independent?
 A) being a senior; going to homeroom
 B) registering to vote; being left-handed
 C) having a car accident; having a junior license
 D) doing the Statistics homework; getting an A on the test
 E) having 3 inches of snow in the morning; being on time for school

- ___ 3. A poll of 120 Ithacans found that 30 had visited the Museum of the Earth, and that 80 had been to Home Depot. If it appeared that going to Home Depot and going to the Museum of the Earth were independent events, how many of those polled had been to both ?
 A) 10 B) 15 C) 20 D) 24
 E) It cannot be determined.

		Museum		Total
		Yes	No	
Home Depot	Yes	??		80
	No			40
Total		30	90	120

- ___ 4. Six Republicans and four Democrats have applied for two open positions on a planning committee. Since all the applicants are qualified to serve, the City Council decides to pick the two new members randomly. What is the probability that both come from the same party?
 A) $\frac{66}{90}$ B) $\frac{52}{90}$ C) $\frac{32}{100}$ D) $\frac{42}{90}$ E) $\frac{42}{100}$

- ___ 5. A friend of yours plans to toss a fair coin 200 times. You watch the first 40 tosses, noticing that she got only 16 heads. But then you get bored and leave. If the coin is fair, how many heads do you expect her to have when she has finished the 200 tosses?
 A) 80 B) 92 C) 96 D) 100 E) 116

- ___ 6. A national study found that the average family spent \$422 a month on groceries, with a standard deviation of \$84. The average amount spent on housing (rent or mortgage) was \$1120 a month, with standard deviation \$212. The expected total a family spends on food and housing is $422+1120 = \$1542$. What is the standard deviation of the total?
 A) \$128 B) \$148 C) \$228 D) \$295 E) It cannot be determined

- ___ 7. Which of these has a geometric model?
 A) The number of black cards in a 10-card hand.
 B) The colors of the cars in the grocery store parking lot.
 C) The number of hits a baseball player gets in 6 times at bat.
 D) The number of cards drawn from a deck until we find all four aces.
 E) The number of people we survey until we find someone who owns an iPod.

- ___ 8. Which of those choices listed in problem 7 is most likely to have a binomial model?

- ___ 9. Pepsi is running a sales promotion in which 12% of all bottles have a “FREE” logo under the cap. What is the probability that you find two free ones in a 6-pack?
 A) 1% B) 11% C) 13% D) 23% E) 97%

- ___ 10. A supermarket claims that their checkout scanners correctly price 99.8% of the items sold. How many items would you expect to buy, on average, to find one that scans incorrectly?
A) 2 B) 99.8 C) 200 D) 500 E) 998
11. **Annual review** You are up for your annual job performance review. You estimate there's a 30% chance you'll get a promotion, a 40% chance of a raise, and a 20% chance of getting both a raise and a promotion.
- Find the probability that you get a raise or promotion.
 - Are the raise and the promotion independent events? Explain.
12. **Studying** Assume that 75% of the AP Stat students studied for this test. If 40% of those who study get an A, but only 10% of those who don't study get an A, what is the probability that someone who gets an A actually studied for the test?
13. **Basketball player heights** Assume the heights of high school basketball players are normally distributed. For boys the mean is 74 inches with a standard deviation of 4.5 inches, while girl players have a mean height of 70 inches and standard deviation 3 inches. At a mixed 2-on-2 tournament teams are formed by randomly pairing boys with girls as teammates.
- On average, how much taller do you expect the boy to be?
 - What will be the standard deviation of the difference in teammates' heights?
 - On what fraction of the teams would you expect the girl to be taller than the boy?

14. **Credit card sales** The National Association of Retailers reports that 62% of all purchases are now made by credit card; you think this is true at your store as well. On a typical day you make 20 sales.

a. Explain why your sales can be considered Bernoulli trials.

b. What is the probability that your fourth customer is the first one who uses a credit card?

c. Let X represent the number of customers who use a credit card on a typical day. What is the probability model for X ? Specify the model (name and parameters), and tell the mean and standard deviation.

Model _____ Mean _____ SD _____

d. What is the probability that on a typical day at least half of your customers use a credit card?

15. **Cigarette taxes** New York public health officials report that currently 22% of adults smoke (*Ithaca Journal*, 1/12/04). They hope that newly increased state cigarette taxes will reduce this rate. They plan to check in December by selecting a random sample of 1200 New Yorkers to estimate again the percentage of adults who smoke.

a. Verify that a Normal model is a useful approximation for the binomial in this situation.

b. In that December sample, how many smokers would it take to convince you that the percentage of NY adults who smoke had decreased significantly? Explain.

16. **Dice rolls** Two players compete against each other by rolling dice – not the traditional dice, though. One face of Alphonso's die has an 8 and the other five faces are all 2's. Bettina's die has four 3's and two 1's on the six faces.

a. They each roll their die, and the player with the highest score wins. Which player has the advantage? Explain.

b. If Alphonso wins, Bettina pays him \$10. How much should he pay her if she wins in order to make the game fair?

c. They decide to change the rules. They'll each roll, and the winner will collect the number of dollars shown on his or her die. For example, If Alphonso rolls a 2 and Bettina rolls a 3, he'll pay her \$3. Create a probability model for the amount Alphonso wins.

d. Find the expected value and standard deviation of Alphonso's winnings at this game.

e. If they play this new game repeatedly which player has the advantage? Explain.