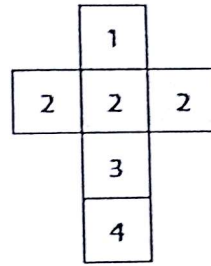
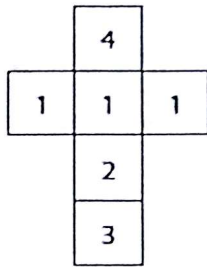


Matt uses the nets below to make two dice.

| | | | | | | |
|---|----|----|----|----|----|----|
| | 1 | 1 | 1 | 2 | 3 | 4 |
| 1 | 11 | 11 | 11 | 12 | 13 | 14 |
| 2 | 21 | 21 | 21 | 22 | 23 | 24 |
| 2 | 21 | 21 | 21 | 22 | 23 | 24 |
| 2 | 21 | 21 | 21 | 22 | 23 | 24 |
| 3 | 31 | 31 | 31 | 32 | 33 | 34 |
| 4 | 41 | 41 | 41 | 42 | 43 | 44 |



36 outcomes.

a. If Matt rolls these two dice, what is the probability that he rolls doubles?

$$\frac{8}{36}$$

b. What assumption did you make when finding the probability in Part a?

All sides are equally likely to show up.

c. After rolling the two dice, Matt adds the two numbers. Make a probability distribution table for the sum of the numbers on the two dice.

| Sum | # of times | Prob. |
|-----|------------|-----------------|
| 2 | 111 | $\frac{3}{36}$ |
| 3 | | $\frac{10}{36}$ |
| 4 | | $\frac{7}{36}$ |
| 5 | | $\frac{8}{36}$ |
| 6 | | $\frac{5}{36}$ |
| 7 | | $\frac{2}{36}$ |
| 8 | | $\frac{1}{36}$ |

d. What is the probability that the sum is less than 4?

$$\frac{10}{36} + \frac{3}{36} = \frac{13}{36}$$

e. What is the probability that the sum is odd or greater than 4? Explain your reasoning or show your work.

$$\frac{10}{36} + \frac{8}{36} + \frac{2}{36} + \frac{5}{36} + \frac{1}{36} = \frac{26}{36}$$

2. A person is picked at random from your town.

a. Describe two events that would be mutually exclusive. Explain your reasoning.

Democrat or Republican

b. Describe two events that would not be mutually exclusive. Explain your reasoning.

Democrat or female.

3. According to a Gallup Poll, 45% of Americans own a dog, 34% own a cat, and 20% own both. Find the probability that a randomly selected American owns a dog or a cat. Explain your reasoning.

$$45 + 34 - 20 = 59\%$$

4. Recently there have been several advertising campaigns to educate people about how harmful smoking is to your health. A survey asked 3,016 adults the question, "How harmful do you feel smoking is to adults who smoke?" The survey also asked if the person was a smoker. The results of the survey are given in the table below.

| Opinions on Harmfulness of Smoking | | | | | |
|------------------------------------|--------------|------------------|-----------------|--------------------|-------|
| | Very Harmful | Somewhat Harmful | Not Too Harmful | Not At All Harmful | Total |
| Smokers | 456 | 210 | 40 | 18 | 724 |
| Nonsmokers | 2,015 | 229 | 23 | 25 | 2,292 |
| Total | 2,471 | 439 | 63 | 43 | 3,016 |

Source: www.gallup.com/poll/content/default.aspx?ca=12886; survey reported August 31, 2004

Assuming that this survey is representative of the adult population in the United States, and that you randomly choose an adult from the United States, find the following probabilities.

- a. What is the probability that the adult is a smoker?

$$\frac{724}{3016}$$

- b. What is the probability that the person thinks that smoking is very or somewhat harmful to adult smokers?

$$\frac{439}{3016} + \frac{2471}{3016} = \frac{2910}{3016}$$

- c. What is the probability that the person is a smoker and is a person who thinks that smoking is very or somewhat harmful to adult smokers?

$$\frac{456}{724} + \frac{210}{724} = \frac{666}{724}$$

- d. What is the probability that the person is a smoker or someone who thinks that smoking is very or somewhat harmful to adult smokers?

$$\begin{array}{l} \text{Smoker} \\ 724 \end{array} + \begin{array}{l} \text{Very Harm.} \\ 2471 \end{array} + \begin{array}{l} \text{Somewhat} \\ \text{harm.} \\ 439 \end{array} - \begin{array}{l} \text{Both} \\ \text{smoke} \\ \text{+ Harm} \\ 456 \end{array} - \begin{array}{l} \text{Both} \\ \text{smoke} \\ \text{+ somewhat} \\ 210 \end{array}$$

$$\frac{2968}{3016}$$

The table below shows the results of tossing a tetrahedral die (sides labeled 1, 2, 3, and 4) and getting a 4.

| Number of Tosses | Cumulative Frequency of 4s | Cumulative Proportion of 4s |
|------------------|----------------------------|-----------------------------|
| 5 | 1 | 0.20 |
| 10 | 4 | 0.40 |
| 20 | 7 | 0.35 |
| 30 | 10 | 0.33 |

a. Describe what will happen to the proportion of 4s as the number of tosses increases.

It will get closer to $\frac{1}{4}$ or .25

b. How does this illustrate the Law of Large Numbers?

the more tosses the more accurate the experiment

6. The table below indicates the number of physicians in Minnesota in 2005 by age and gender. Suppose that you randomly choose one of these physicians to interview. Find each of the following probabilities. (Source: Minnesota Physicians Facts and Data 2005)

| | Under 65 | 65 or Older | Total |
|--------|----------|-------------|-------|
| Male | 5,373 | 586 | 5,959 |
| Female | 2,259 | 35 | 2,294 |
| Total | 7,632 | 621 | 8,253 |

a. $P(\text{female})$

$$\frac{2294}{8253}$$

c. $P(\text{female and under 65})$

$$\frac{2259}{8253}$$

e. $P(\text{female} \mid \text{under 65})$

$$\frac{2259}{7632}$$

b. $P(\text{under 65})$

$$\frac{7632}{8253}$$

d. $P(\text{female or under 65})$

$$\frac{7667}{8253}$$

f. $P(\text{under 65} \mid \text{female})$

$$\frac{2259}{2294}$$

g. Are gender and age of physicians in Minnesota in 2005 independent? Support your reasoning using information from the table.