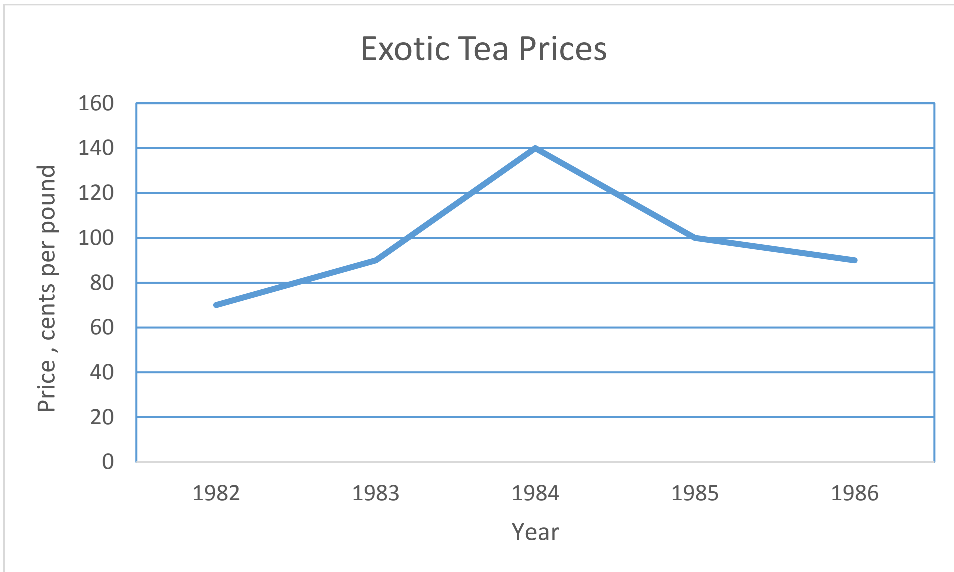
UNDERSTANDING HOW TO READ GRAPHS

Information is often presented in the form of a **graph**, a diagram that shows numerical data in a visual form. Graphs enable us to “see” relationships that are difficult to describe with numbers alone.

Reading Line Graphs

In some graphs, points are plotted and connected by lines to present information. The following figure is such**.** The position of each dot represents the average price of tea, in cents per pound, for the year shown directly beneath it. The dots are connected by lines so that readers can see more clearly the changes, up and down, in the data. The most important thing to remember about reading line graphs is to inspect each axis to see the unit. For example, the graph below shows that the tea price is expressed in cents per pound, which means that the value “120” is 120 cents or $1.20 per pound.



EXAMPLE

In what year did tea first average more than 90 cents per pound?

SOLUTION

We locate 90 cents on the price scale at the left. A horizontal line at 90 cents crosses the graph just about at the 1983 mark. Between 1983 and 1984, the graph rises higher than 90 cents. So tea costs more than 90 cents a pound for the first time in 1983.

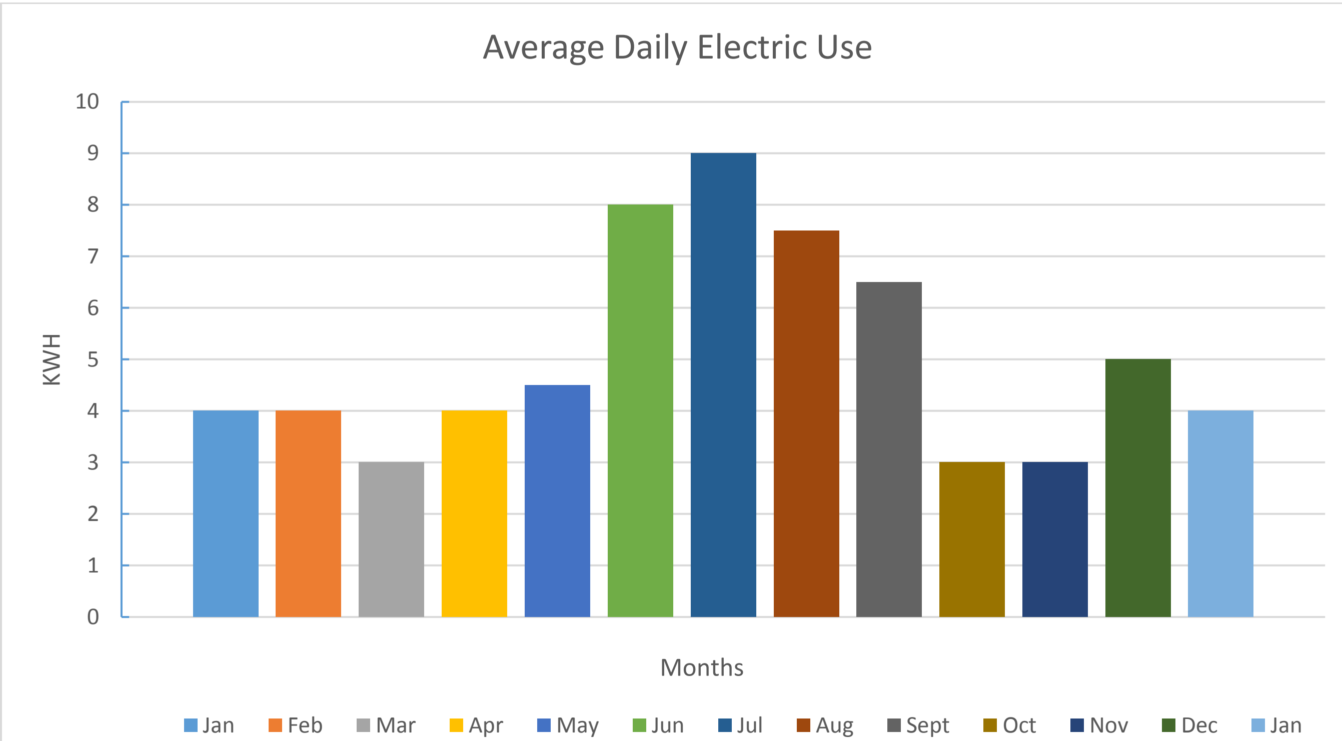
PRACTICE PROBLEMS

Use the graph above to answer the following questions.

1. List the years in order from least expensive to most expensive.
2. Which two years showed the greatest increase in tea prices?
3. Which pairs of years showed tea prices rise by the same amount that tea prices fell?

Reading Bar Graphs

The bar graph on the next page shows the amount of electricity used daily, on the average, by a certain customer in each of 13 successive months.



Information that helps you read the graph is given along the bottom and left side of the graph. Along the bottom are the months covered by the graph, abbreviated, from January 1996 to January 1997. There is one bar for each month. The height of the bar gives the average amount of electricity used per day in kilowatt hours (kwh) for its month. The height is read on the scale at the left of the graph. Sometimes the values are not consecutive; it depends on the size of the physical size of the graph.

EXAMPLE

a. How many kilowatt hours did this customer use daily during March, to the nearest whole number?
b. During four of the months shown, the customer used the same number of kilowatt hours per day. Which months were these?

SOLUTION

a. The third bar from the left, the bar for March, ends halfway between 2 and 4. Thus, during March this customer used 3 kilowatt hours per day.
b. We must find four bars that are the same height. These occur in January of both years, February, and April .They have a height of 3 kwh.

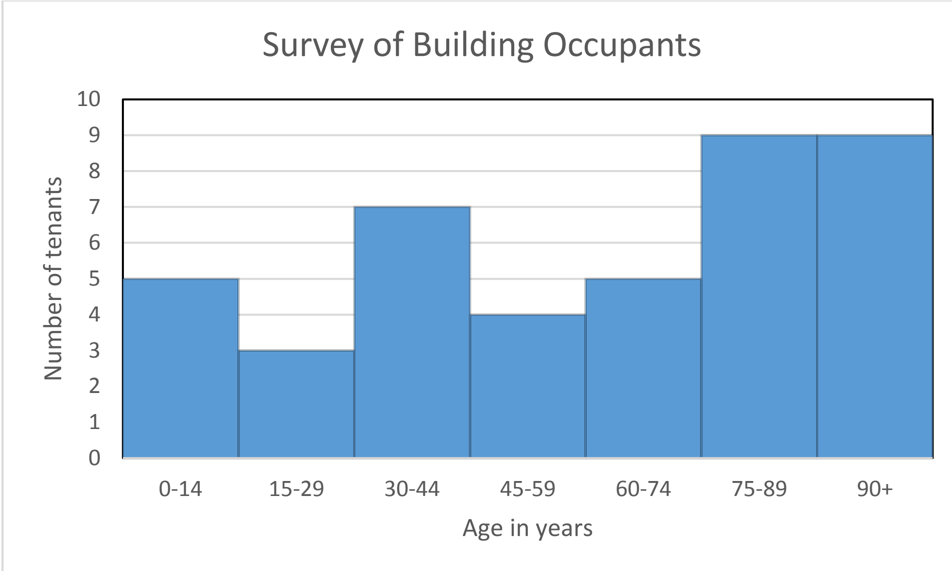
PRACTICE PROBLEMS

Use the Average Daily Electric Use graph to answer the following questions.

1. How many kilowatt hours were used in October?
2. How many kilowatt hours were used altogether in the months April and June?

Reading a Histogram

Some kinds of graphs use the widths and lengths of vertical bars to represent information. The graph shown here is a histogram. The width of each bar indicates the age intervals of about 15 years. The scale at the left indicates the number of tenants in each age interval. The length of each bar indicates how many tenants in the building fall within the specific age groups.



EXAMPLE
How many tenants are there altogether living in the building?

SOLUTION
To find the total number of tenants we must add all of the bars:

$$5 + 3 + 7 + 4 + 5 + 9 + 9 = 42$$

There are 42 tenants in the building.

PRACTICE PROBLEMS

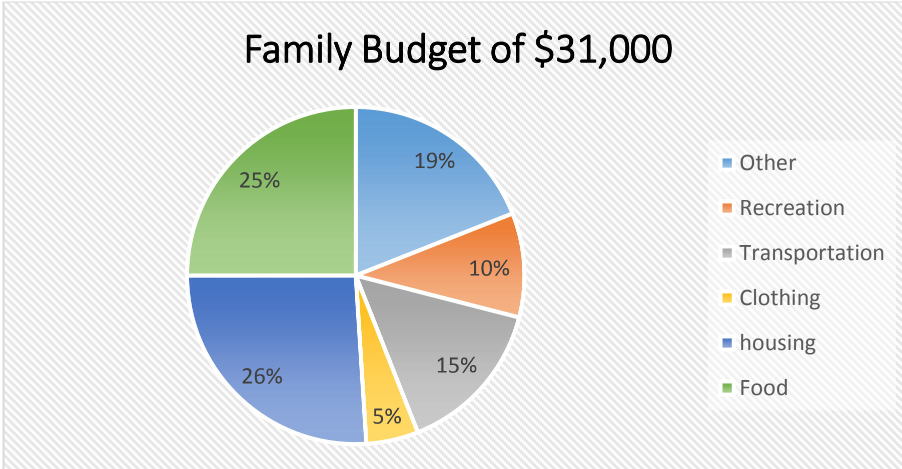
1. What percent of the tenants in this building are less than 60 years of age? Round to the nearest whole percent.
2. What percent of the tenants are at least 30 but less than 60 years of age? Round to the nearest whole percent.
3. What percent of the tenants in this building are less than 90 years of age but at least 60 years old? Round to the nearest whole percent.
4. What is the ratio of the number of tenants under 30 to the number of tenants under 75 years of age?

Reading A Circle Chart

A common type of data display in business reports, newspapers, and magazines is a **circle chart**, or **pie chart.** In a circle chart, the total is represented as a circle, and the parts that make up the total are shown as "slices." The numbers are usually given in the form of percents; the total is 100%.

EXAMPLE

The following chart shows how a family spends its yearly income of $31,000. How much money does this family spend on transportation?



SOLUTION

The chart indicates that 15% of the income is spent on transportation. We must answer the question: 15% of $31,000 is what?

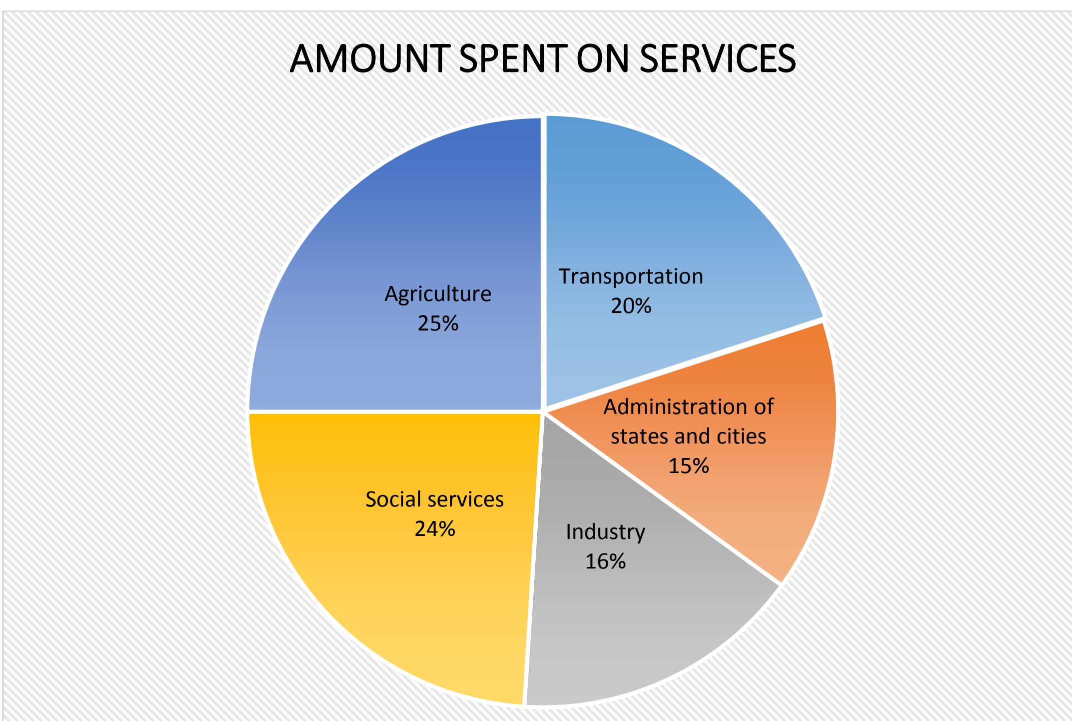
Writing as an equation and solving, we get

$$n = 0.15 \times 31{,}000 = 4650$$

So the family spends $4650 on transportation yearly.

PRACTICE PROBLEMS

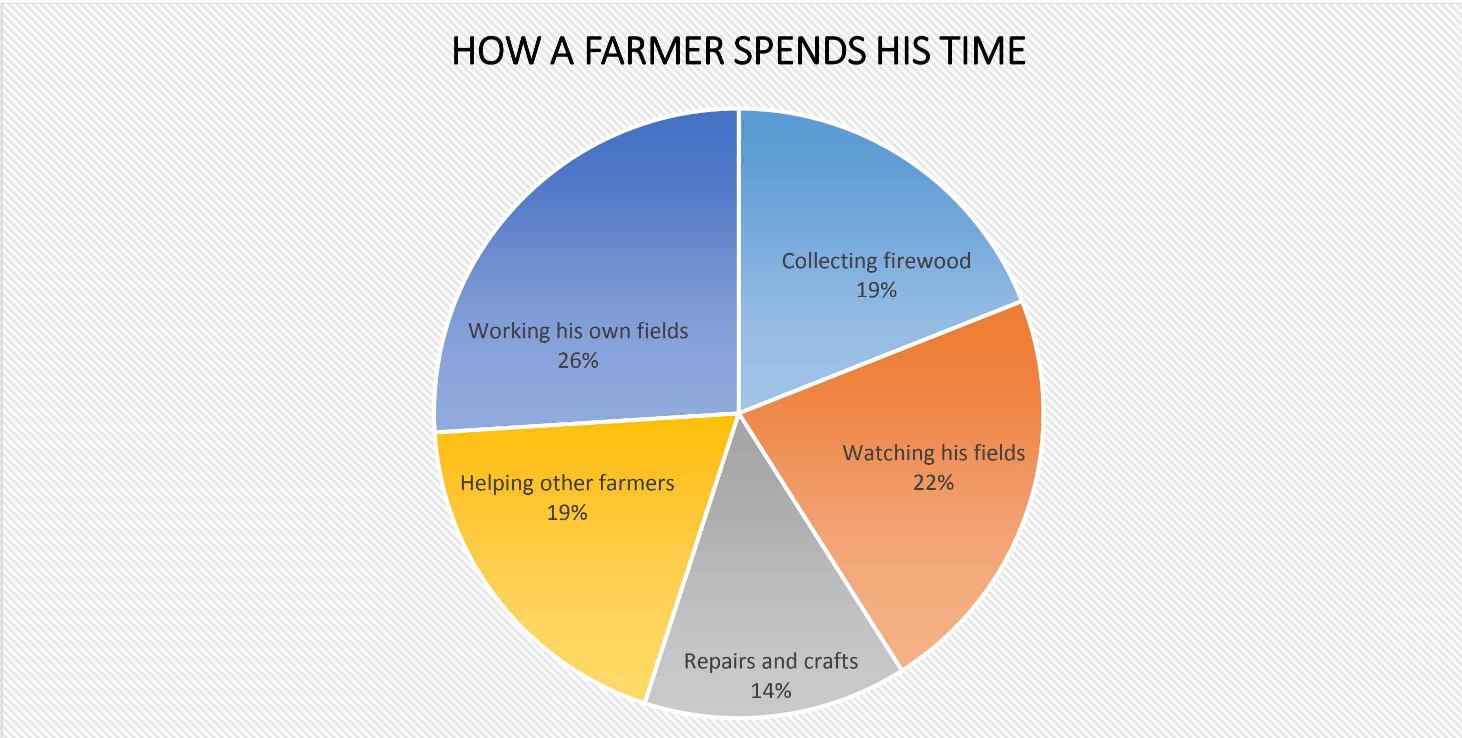
The chart below represents the way a third-world government intends to spend money received on the sale of oil to the United States. (The total amount of money received is $2 billion.) Use this information to answer exercises 1 and 2.



1. How much will the country spend on social services and agriculture together?

2. How much more will be spent on industry than on the administration of states and cities?

The chart below shows how a farmer in a certain third-world country spends his time. Assume that the entire circle represents a 16-hour work day, and use this information to answer Exercises 3 - 6.



3. How many hours does he spend working his own fields and helping other farmers?

4. How many minutes does he spend collecting firewood?

5. What is the ratio of the amount of time spent on repairs and crafts to the time spent working the farmer's own fields and helping other farmers?

6. What is the ratio of the amount of time a farmer spends sleeping to the amount of time shown in the chart?

ANSWERS TO PRACTICE PROBLEMS

LINE GRAPH: 1. 1982, 1986, 1983, 1985, 1984 2. 1983 to 1984 3. 1982-1983 and 1985-1986

BAR GRAPH: 1. 93 kilowatt hours 2.360 kilowatt hours

HISTOGRAM: 1. 45% 2. 26% 3. 33% 4. $\frac{1}{3}$

CIRCLE GRAPH: 1. \$980,000,000 2. \$20,000,000 3. 7.2 hours 4. 182.4 minutes
5. 14/45 6. 1/2