# MTH 102

Supplemental Material

(Lessons 34-38)

When reading and interpreting graphs, an informed and intelligent reader needs some skills to correctly evaluate what is being presented. The following exercises will help strengthen those skills.

1. Cindy sold 9 tickets to the school play and Sarah sold 12 tickets. What is the ratio of the number of tickets Cindy sold to the number of tickets Sarah sold?

2. Out of 630 doctors surveyed, 504 recommend aspirin therapy to their patients. Write the ratio, as a fraction in simplest form, of doctors who recommend aspirin therapy to the total number of doctors surveyed?

3. Find the ratio of 2 hours to 20 minutes.

   A. $\dfrac{10}{1}$ B. $\dfrac{1}{6}$ C. $\dfrac{1}{10}$ D. $\dfrac{6}{1}$

4. The ratio of cars to people in New Zealand is 350 to 1000. Compare as ratio in simplest form.

   A. $\dfrac{7}{10}$ B. $\dfrac{350}{1000}$ C. $\dfrac{7}{40}$ D. $\dfrac{7}{20}$

5. A consultant earns $113,000 per year by working 200 days a year. Assuming her daily salary is the same, how much would her annual income be if she worked 250 days in one year?

6. If you travel 348 miles in your car on 12 gallons of gasoline, how far can you travel in your car on 8 gallons of gasoline?

7. An astronaut who weighs 175 pounds on Earth would weigh 45 pounds on the Theta Space Station. If a piece of equipment weighed 2100 pounds on Earth, what would it weigh on the Theta Space Station?
   A. 585 lb   B. 552 lb   C. 540 lb   D. 594 lb

8. Bob wants to find the best buy on laundry soap. Brand A costs $6.02 for 40 ounces. He has a coupon for $0.50 off the regular price of Brand B, which costs $7.22 for 48 ounces. Brand C costs $5.13 for 32 ounces. Which of these is the best buy?
   A. Brand B
   B. Brand B and Brand A cost the same price per ounce
   C. Brand A
   D. Brand C

9. Which is the more economical purchase, a 12-ounce container of yogurt priced at $2.29 or a 5-ounce container of yogurt priced at $0.89?

10. The cost of a calling card telephone call is $2.00 for the first five minutes and $0.75 for each minute over five minutes. Find the length of a call that costs $8.75.

11. The charge for mailing a fourth-class package through the U.S. Postal Service is
    $C = 0.08x + 2.58$
    where C is the charge in dollars and x is the weight of the package in pounds.
    a. Find the charge to mail a package that weighs 9 pounds.
    b. How many pounds can be mailed for $3.54?

A. a. $3.30	B. a. $0.56	C. a. $3.09	D. a. $3.30
b. $12 lb	b. 14 lb	b. 11 lb	b. 13 lb

12. The velocity of an object is given by the equation $v = 125 - 32t$, where v is the velocity in feet per second and t is the number of seconds after the object is released. How fast will the object be moving 3.2 seconds after it was released?

13. 43% of the students are from out-of-state. If there 18,300 students, how many are from out-of-state?

14. An investor received a dividend of $28.50, which was 0.2% of the value of the investment. Find the value of the investment.

15. If you answer 32 questions correctly on a 40-question exam, what percent of the questions did you answer correctly?

16. An investor received a dividend of $43.95 which was 0.5% of the value of the investment. What was the value of the investment?
   A. $87.90
   B. $219.75
   C. $8790.00
   D. $2197.50

17. Theresa made 35 of 40 free throws at basketball practice. Which percent did she make?
   A. 12.5%   B. 46.7%   C. 87.5%   D. 5%

18. A study finds that 67% of students prefer internet resources to textbooks. Based on this survey, out of 200 students, how many prefer internet resources to textbooks?
   A. 134   B. 67   C. 66   D. 33

19. Margarette correctly answered 36 questions on an English test. She received a score of 90%. How many questions were on the test?
   A. 50   B. 45   C. 47   D. 40

20. The graph shows the amount reported in sales for a software company over a four year period. Find the percent of decrease in sales from 1999 to 2000.
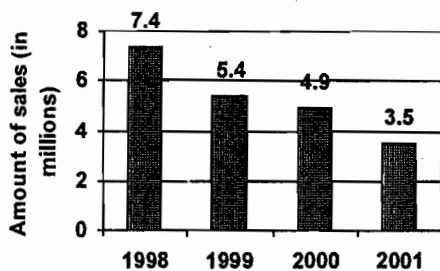
   A. 110.2%   B. 10.2%   C. 90.7%   D. 9.3%

21. The sales of Kids sneakers rose from $3 million to $3.7 million. Find the percent increase to the nearest whole percent.
   A. 2.5%   B. 25%   C. 2.3%   D. 23%

22. At the start of the spring it was estimated that 2637 fish were in the lake. At the end of the winter, a new survey was taken and it was estimated that 3335 fish were in the lake. What is the percent increase in the population to the nearest percent?
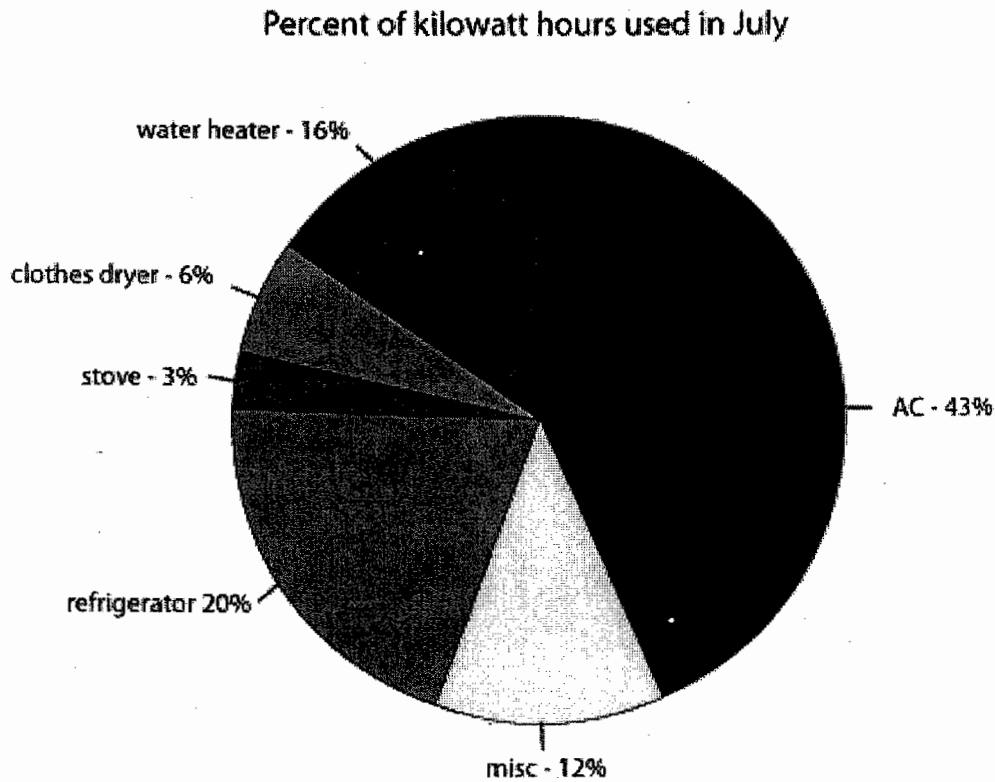
Marital status of persons 65 years or older.

each unit is 10 million people
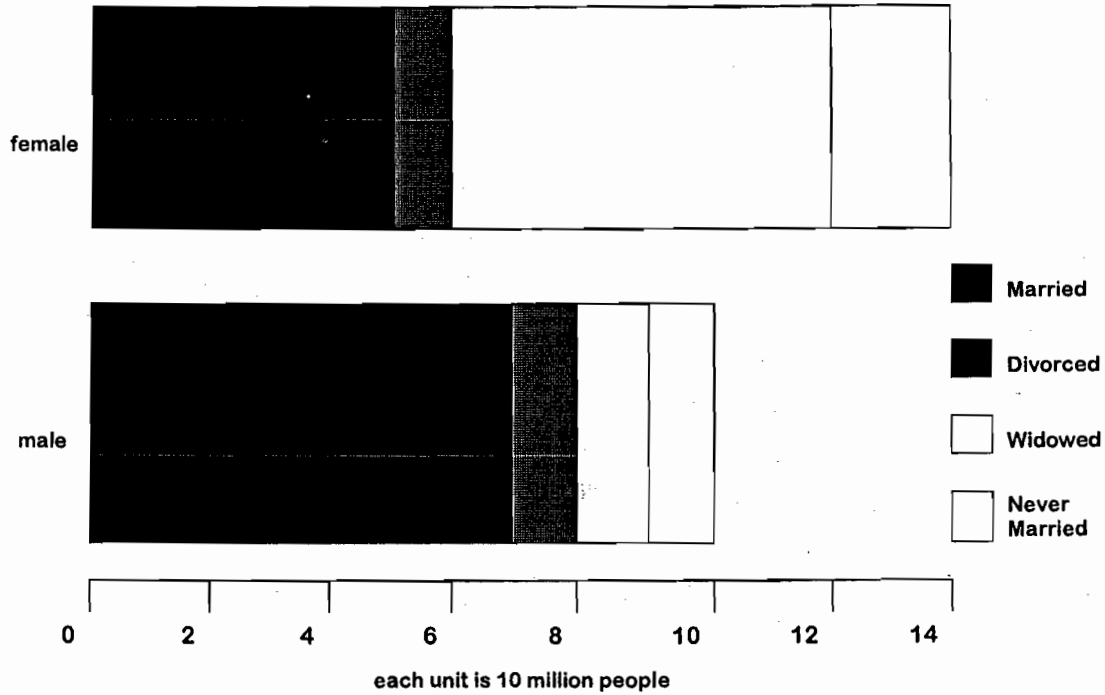
23. What is the total number of women age 65 or older?

24. What is the total number of men and women age 65 or older?

25. How many more widowed women are there than widowed men (age 65 or older)?

26. What is the ratio of married women to married men (age 65 or older)?

27. What % of women (age 65 or older) are widowed?

28. What % of all persons, men and women combined (age 65 or older) are widowed?

For questions 1-3 use the following information:

The percent of electricity used in the month of July in a typical all-electric home is shown below:

Percent of kilowatt hours used in July

water heater - 16%

clothes dryer - 6%

stove - 3%

AC - 43%

refrigerator 20%

misc - 12%

1. Mr. & Mrs. Jones used a total of 1200 kilowatt hours of electricity during July. How many kilowatt-hours of electricity were used for air conditioning?

2. How many kilowatt-hours of electricity was used for the water heater, the clothes dryer and the stove if a total of 1200 kilowatt hours were used in July?

3. Of the total kilowatt-hours used in the kitchen (refrigerator and stove) what percentage was used for cooking?

For questions 1-3 use the following information:

Number of applications received to medical college
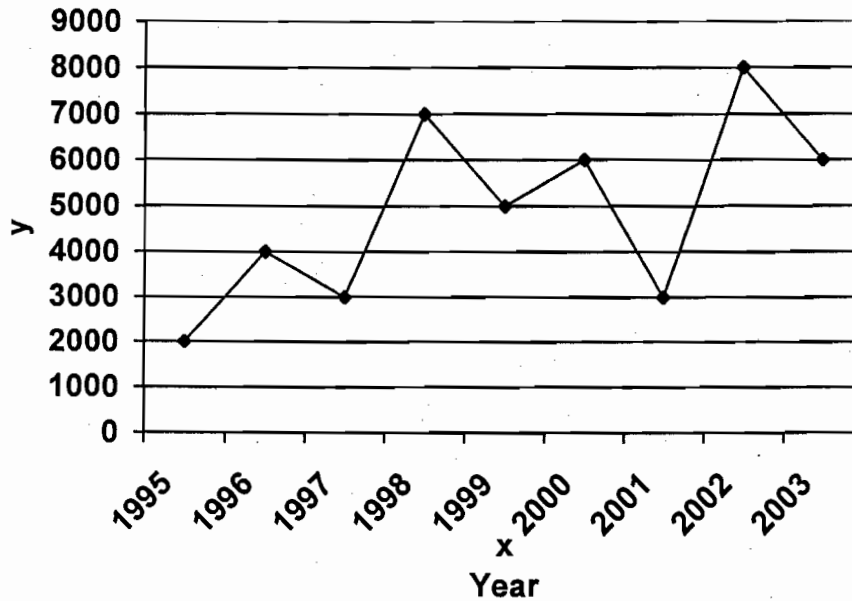
1. During which one-year time period did the number of applications received drop the most? Explain your answer.

2. By what percentage did the number of applications drop during the period referred in the previous question?

3. What is the total number if applications received between the years of 1995 and 2003 inclusive?

The grade distribution in Professor Jones' English class and Professor Brown's math class is summarized in the table below:

Grades		A	B	C	D	F	W
No. of	Prof. Jones	5	4	1	3	3	1
students	Prof. Brown	2	6	4	5	2	4

1. Which teacher had more students? Explain your answer in words.

2. Which teacher assigned a larger percent of A's and B's combined in his class?

3. If the grade points assigned by Professors Jones and Brown respectively in their classes?
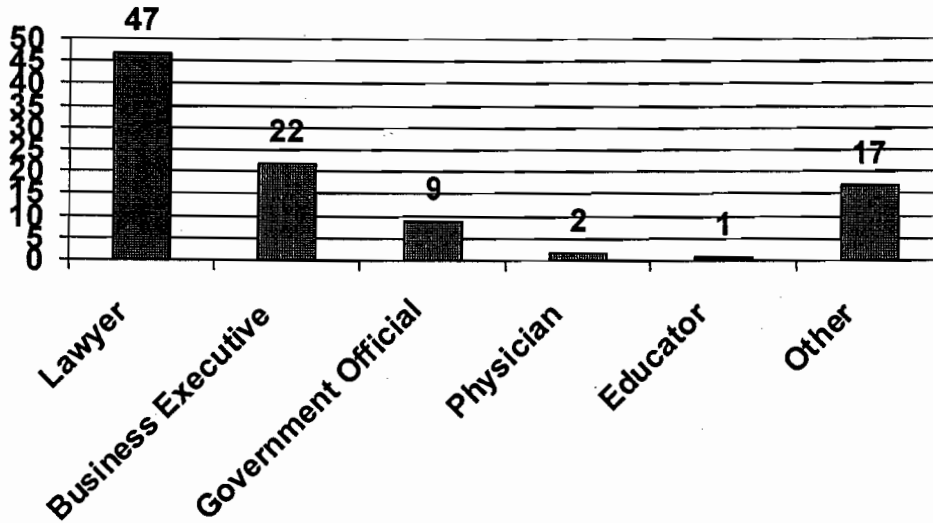
A	B	C	D	F	W
4.0	3.0	2.0	1.0	0	0

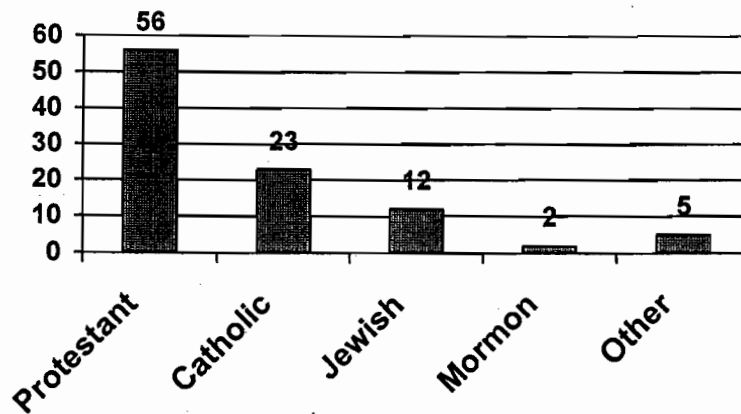Find the average grade point assigned by Professors Jones and Brown respectively in their classes?

Questions 1-3 below refer to these graphs.

## Occupation & Religious Affiliation of Senators

Occupation

Religion

1. What percent of the Senate is comprised of lawyers?

2. If all of the business executives and physicians in the Senate vote for the passage of a bill, how many more votes will be needed for majority?

3. If eleven senators are Catholic lawyers, how many non-Catholic, non lawyers are in the senate?

Water Usage
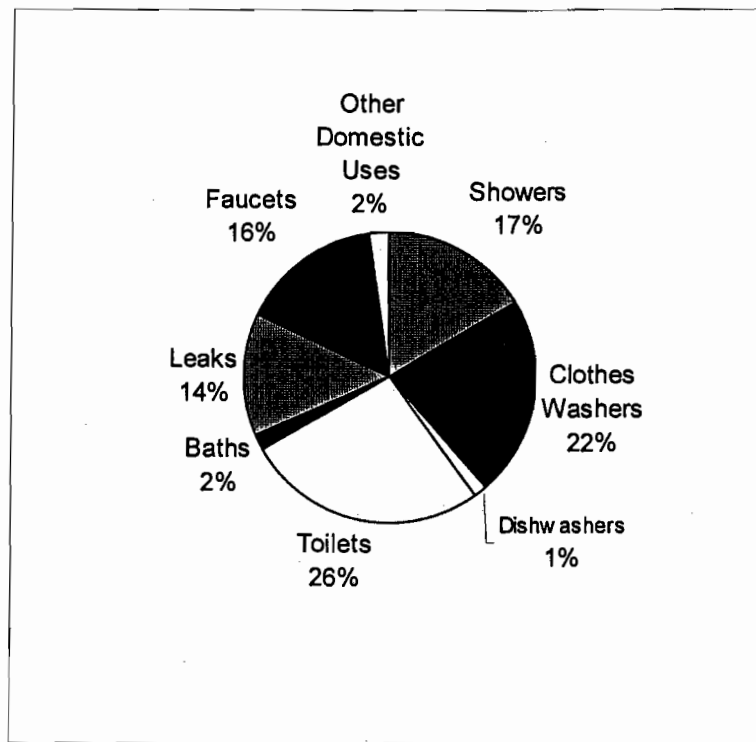
1. If the chart represents one month in June in a typical Staten Island household using a total of 26,000 gallons of water during one month, find:
a) the number of gallons wasted in June from leaks

b) the price of your bill in June if you if you pay $.0014 per gallon of water

c) how many less gallons were used for baths than showers

d) how many gallons of water are used *weekly* on average by washing clothes

e) the ratio of gallons of water used in June by the dishwasher compared to other domestic uses

2. If you install a water-saving toilet you will reduce daily household water usage by 8.2 gallons of water per person per day (on average). If there are four persons in the family, how many gallons will be saved in June?

3. What is the % decrease by installing this water-saving device?

4. The table below at the right represents the number of miles per gallon of gasoline obtained by 40 drivers of compact cars in a large city.

Mileage (miles per gallon) for compact cars
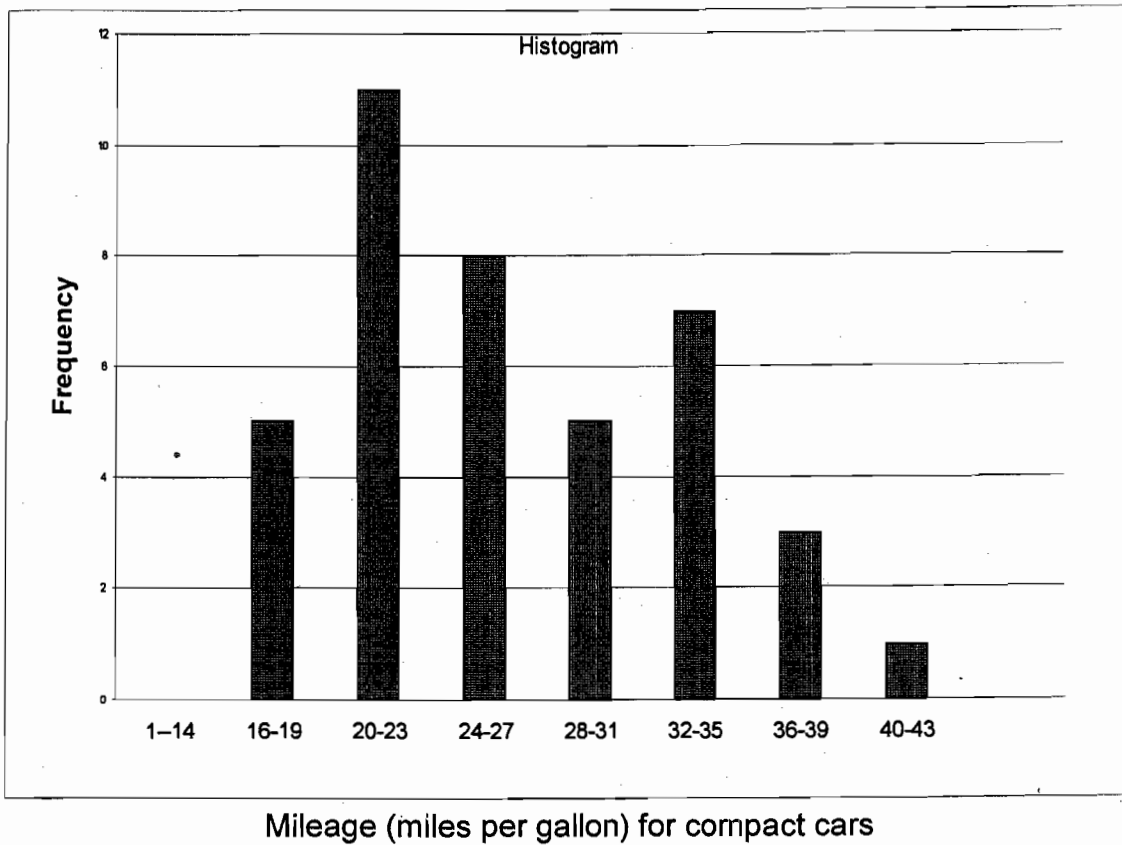
a) How many cars get at least 28 miles per gallon? _____

b) In which interval does the mode lie? _____

c) What percent of the cars reported mileage's from 24 to 27 miles per gallon?

_____

5. The yearly enrollment at a school over a three-year period is shown in the accompanying graph. Show all calculations to support your answers to the following questions.

    a) During which two-year period, 1980-1981 or 1981-1982, was the increase in enrollment the largest?

    b) During which two-year period was the percent increase in enrollment the largest?

Yearly Enrollment

Year	Enrollment
1980	5000
1981	10000
1982	15000
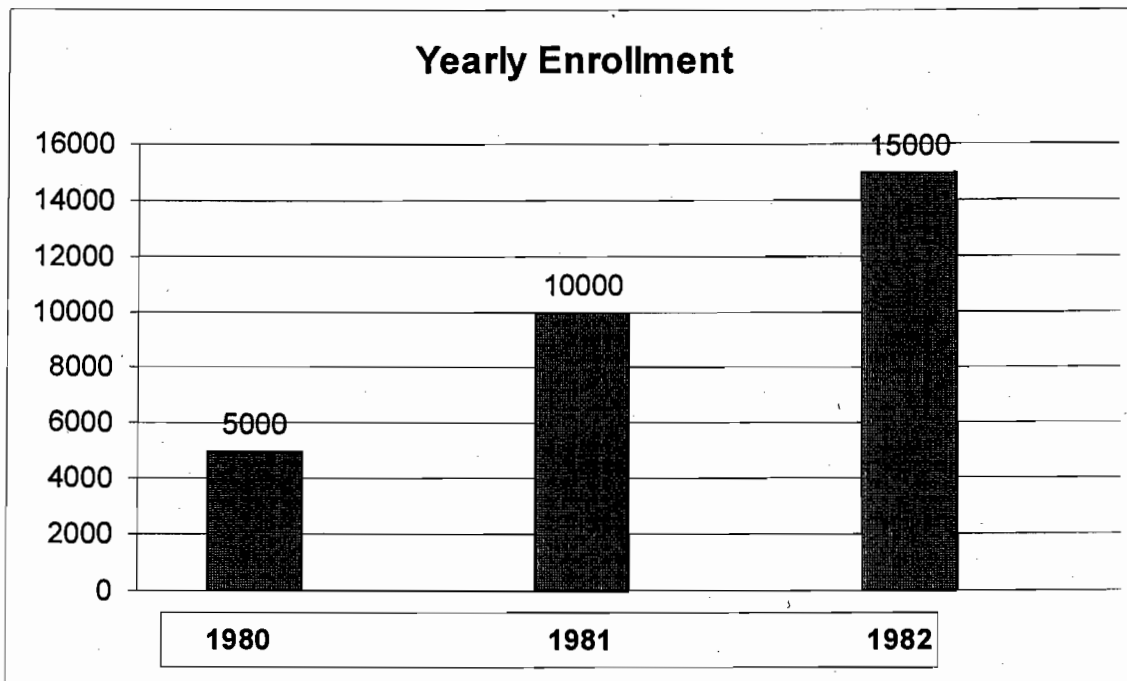
Reading Selection
RECYCLING

Directions
On the following pages, you will see a brief reading selection and two figures (graphs, tables, charts, maps, or other figures) all one the same related topic. Assume that all three came from different sources. Read the reading selection carefully and examine the data presented in the two graphs. Then in a well organized response, state the major claims made in the reading selection and explain how data in the two graphs support and/or challenge those claims. Be specific. Your response will be evaluated for accuracy, completeness, and clarity. As an aid to preparing for your response, you might find it helpful to take notes on the reading passage or list the information presented in the figures. Your notes will not be evaluated.

The following selection recently appeared in a United States newspaper.

Ask most people what kinds of trash are clogging United States landfills, and you're likely to hear: "Beer cans, disposable diapers, glass bottles, Styrofoam cups, and packaging." Such beliefs are pure illusion. In reality the "invisible menace" lurking inside of United States landfills is paper. Newspapers are especially threatening to the health of landfills, since, contrary to popular opinion, they do not biodegrade significantly. (Some unearthed after forty years of burial, have emerged relatively unscathed and completely legible.)

Aggressive recycling is needed in order to reduce these mountains of paper trash, but recycling alone is not the answer. Even though Americans have steadily increased their efforts to recycle household products, recycling has not kept up with the boom in paper use fueled by the increased availability of high-speed printing and communication technologies coupled with a drop in the cost of paper. Because paper is cheap, most Americans just throw away their old newspapers, computers printouts and other paper products. Something must be done because it is clear that, as a nation, we can no longer afford to ignore the skyrocketing use of paper.
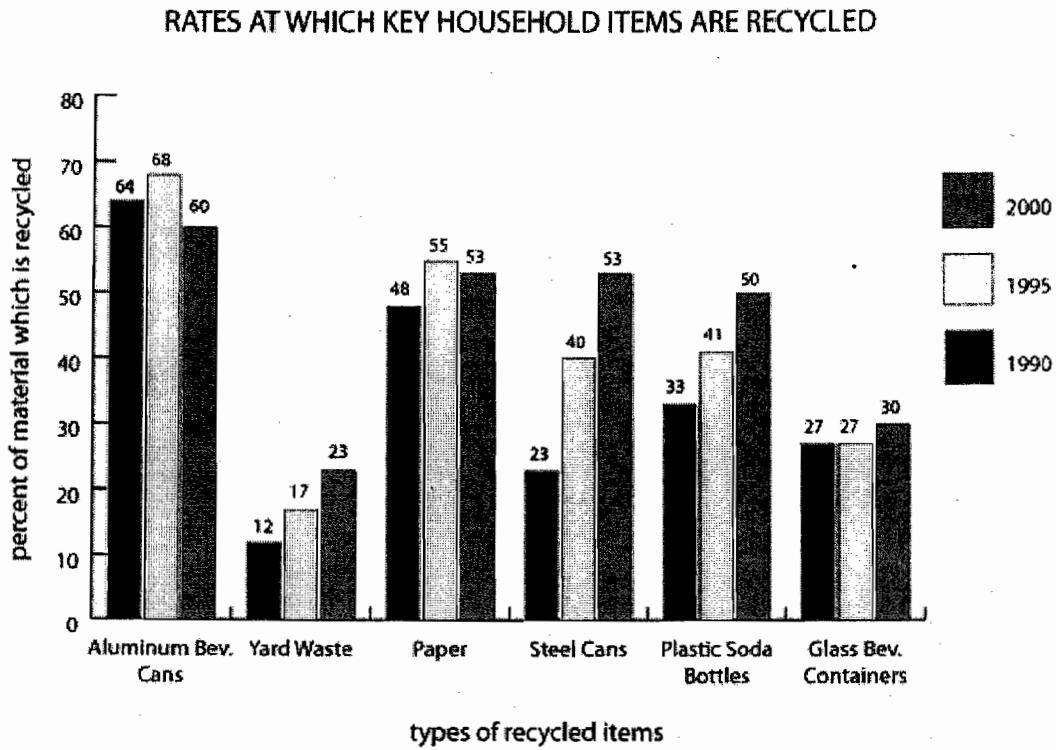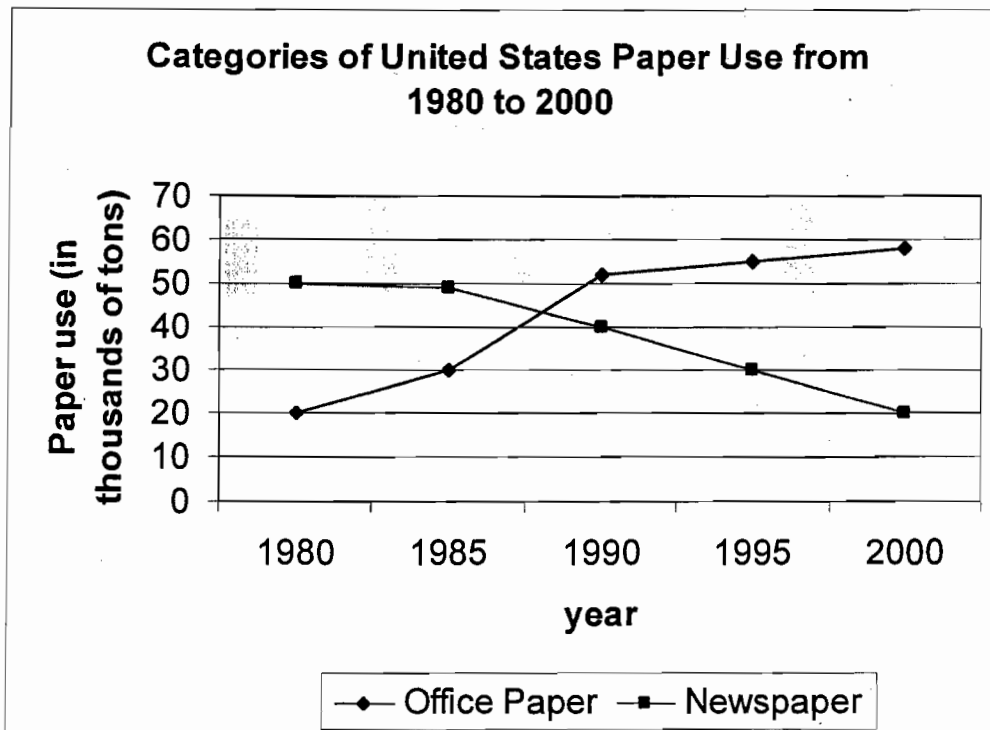
Figure 1

RATES AT WHICH KEY HOUSEHOLD ITEMS ARE RECYCLED

Figure 2

Reading and graph interpreting exercise #1
RECYCLING.

The editorial is about the increasing amount of trash piling up in United States landfills, with particular focus on the boom in paper waste. The author recommends more aggressive recycling and hints at other solutions.

Paragraph 1, sentences 1, 2 and 3:
Ask most people what kinds of trash are clogging United States landfills, and you're likely to hear: "Beer cans, disposable diapers, glass bottles, Styrofoam cups, and packaging." Such beliefs are pure illusion. In reality the "invisible menace" lurking inside of United States landfills is paper.

None of these three sentences are addressed in Fig. 1 or Fig. 2. In the first paragraph, the author asserts that the poor biodegradability of paper makes it the "invisible menace" of landfills and that it is especially problematic in comparison to other landfill constituents. Yet he does not support this assertion in the text or in the figures. Data is nowhere found on the comparative biodegradability of other forms of trash. Neither is paper waste established as the trash category with the greatest landfill abundance. Fig. 1 only deals with the recycling rates of each category of trash, not with their absolute quantities.

Paragraph 2, sentence 2:
Even though Americans have steadily increased their efforts to recycle household products...

This claim is supported by Figure 1, which shows a steady increase in the recycling rates between 1990 and 2000 for most types of recyclables: Yard waste, steel cans, plastic soda bottles and glass beverage containers.

"recycling has not kept up with the boom in paper use..."

Figure 1 directly refutes the author's claim that the recycling rates have not kept up with total paper usage. Even though paper recycling reached a decade peak in 1995, the rate of paper recycling increased from 48% to 53% over the decade 1990 to 2000.

The claim of a "boom" in paper use is not fully supported by Figure 2 and in fact, is partially contradicted by it. Two types of paper use are charted in Figure 2: office paper and newspaper. Although the figure shows a steadily increasing number of tons of office paper usage between 1980 and 2000, it is offset by a precipitous decline in Newspaper tonnage over the same period. In fact, since 1990, the sum of office paper and newspaper tonnage has actually decreased. In 1990 for example, the total tonnage (in thousands of tons) is 40 + 52 = 92, in 1995 it is 30 + 55 = 85, and in 2000 it is 20 + 58 = 78. If these are the two main categories of paper usage in this country then one must conclude that the rate of paper usage in the U.S. remained steady.

Reading Selection
ASTHMA & AIR POLLUTION

Directions
On the following pages, you will see a brief reading selection and two figures (graphs, tables, charts, maps, or other figures) all one the same related topic. Assume that all three came from different sources. Read the reading selection carefully and examine the data presented in the two graphs. Then in a well organized response, state the major claims made in the reading selection and explain how data in the two graphs support and/or challenge those claims. Be specific. Your response will be evaluated for accuracy, completeness, and clarity. As an aid to preparing for your response, you might find it helpful to take notes on the reading passage or list the information presented in the figures. Your notes will not be evaluated.

This article recently appeared in an environmental newsletter.

Asthma and Air Pollution

Asthma, a chronic respiratory (breathing) disease, has become a serious problem in our society. The number of Americans diagnosed with the disease has more than doubled since 1980, with the number steadily increasing each year. Children are especially affected by asthma because their developing lungs, hearts, and blood vessels make them more vulnerable to respiratory infection. Asthma has become a leading cause of chronic illness of children in the United States.

The United States Environmental Protection Agency blames air pollution for the surges in asthma cases in the United States. The most prominent air pollution is ozone, caused primarily by vehicle emissions. Although ozone cannot be seen or tasted, it can irritate lungs and make breathing difficult. Studies have found that high amounts of ozone in outdoor air correspond to increased hospital admissions for respiratory causes such as asthma. During summers, while heat and humidity increase the effect of ozone pollution, an even higher number of hospital visits and admissions caused by respiratory illness occur. Children, already at risk, face great danger in the summer because school vacations allow them more exposure to the outdoors when levels are most dangerous.

The Environmental Protection Agency has made some progress in reducing ozone air pollution through vehicle exhaust regulations, but citizens need to help reduce the amount of ozone-forming pollutants by restricting their use of cars and other gasoline-burning engines,

Figure 1
The following was printed in a medical journal.
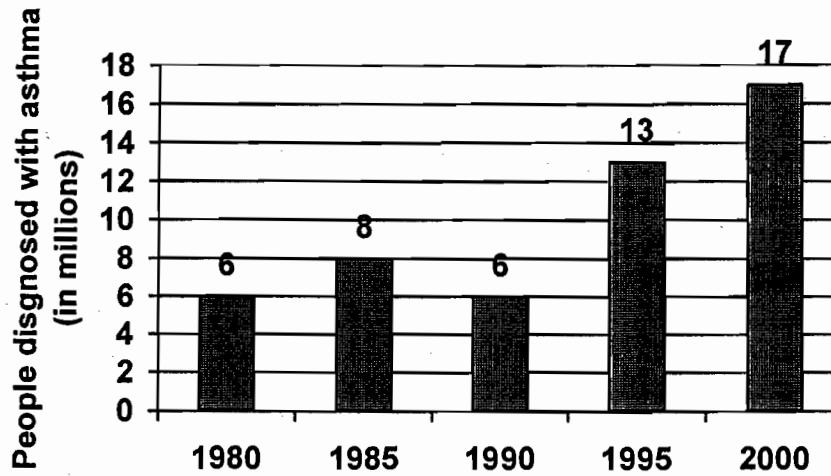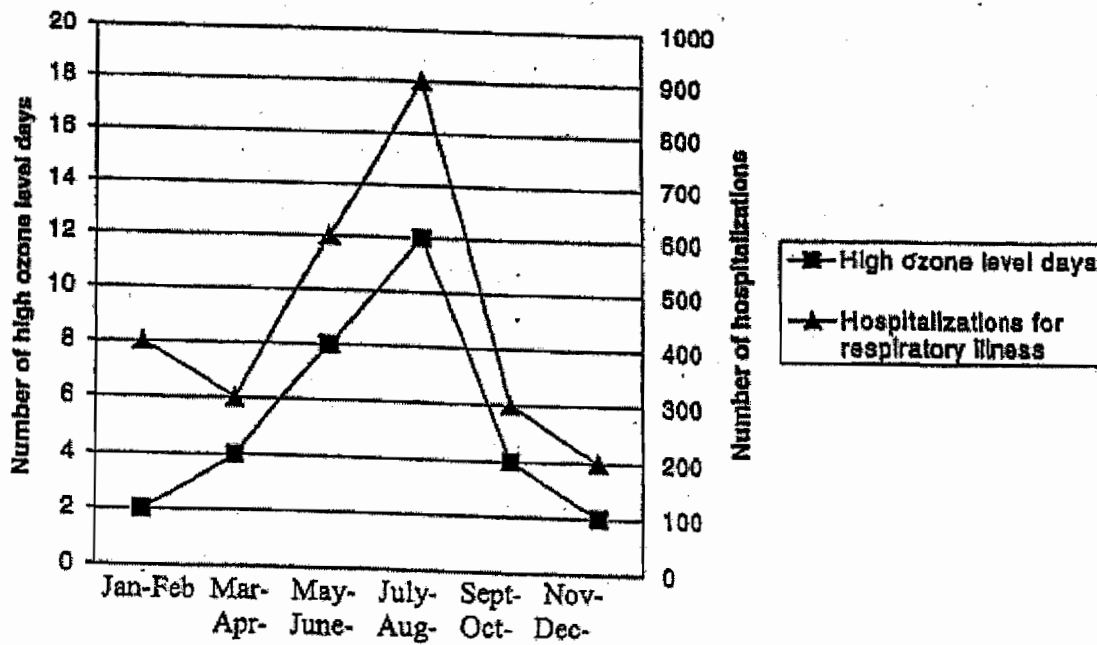
Americans with Asthma 1980-2000

Figure 2
The following graph was published in a science magazine.

Reading and graph interpreting exercise #2
ASTHMA AND AIR POLLUTION.

The editorial concerns the increasing cases of asthma, particularly in children, in the US since 1980. The author places emphasis on atmospheric ozone as the principal causative factor.

Paragraph 1, sentence 2:
The number of Americans diagnosed with the disease [asthma] has more than doubled since 1980...

This claim is convincingly supported by Figure 1, which shows a progressive increase (almost threefold) in the number of asthma cases in 5-year increments between 1980 and 2000, with the exception of 1990 when there was a decrease from the previous 5-year period.

The author's claim that asthma has become *"the leading cause of chronic illness in children"* in the US is not supported by the graphs. Neither figure addresses the population of children, the specific group about which the author's claim is made.

Paragraph 2, sentence 4:
Studies have found that high amounts of ozone in outdoor air correspond to increased hospital admissions for respiratory causes such as asthma.

This claim is supported by Figure 2, which shows a strong positive correlation between the number of high ozone level days during two-month intervals and number of hospitalizations for respiratory illness for the same intervals. I say 'apparently' since the role of high temperatures alone and pollutants other than ozone as causative factors in respiratory distress is not at all addressed. Still, Figure 2 convincingly documents that both the average number of high ozone level days and hospitalizations change in tandem with each other, rising precipitously during summer months and felling away as steeply during surrounding months.

It should be pointed out that Figure 2 contains information only about one city, Chicago, during only one year, 2003. I would be more convinced that the graph supports the author's claims about the ozone-asthma connection of the statistics presented in Figure 2 included more American cities over a wider time span.

The claim that EPA vehicle exhaust regulations have made more progress in reducing ozone levels is neither supported in the text nor the figures.

Reading Selection
POPULATION AGING & THE NURSING SHORTAGE

Directions
On the following pages, you will see a brief reading selection and two figures (graphs, tables, charts, maps, or other figures) all one the same related topic. Assume that all three came from different sources. Read the reading selection carefully and examine the data presented in the two graphs. Then in a well organized response, state the major claims made in the reading selection and explain how data in the two graphs support and/or challenge those claims. Be specific. Your response will be evaluated for accuracy, completeness, and clarity. As an aid to preparing for your response, you might find it helpful to take notes on the reading passage or list the information presented in the figures. Your notes will not be evaluated.

This following article recently appeared in a publication of the Placement Office for a large university.

Population Aging and the Nursing Shortage

The "graying of America" became strikingly evident following the 2000 census. The greatest gains in the population age structure occurred among those aged 40 and over, while those under 40 actually experienced a population reduction. Such population aging is having major consequences and implications for all facets of life in the United States. Most notably, the phenomenon has the potential to profoundly affect the healthcare professions in the very near future.

Experts such as the Bureau of Labor and the American Medical Association predict varying needs and shortages in the healthcare professions. The U.S. Department of Health and Human Services has indentified the nursing shortage as a part of the national healthcare crisis. Compounding the current shortage of active licensed nurses, the rate of nurses entering the profession has slowed considerably over the past five years. With fewer nurses entering the profession, the average age of practicing nurses has risen. This trend, coupled with an aging population structure, raises serious questions about the capacity of our healthcare system to meet future demands.

The need for persons in health-related occupations will steadily rise with the increasingly elderly population. Indicators suggest there will be a progressively greater shortage of nurses to assist with the medical needs of our nation's growing number of aging persons. New strategies for recruitment, education, and healthcare provision will be necessary as the demographic realities of this century become apparent.

Figure 1

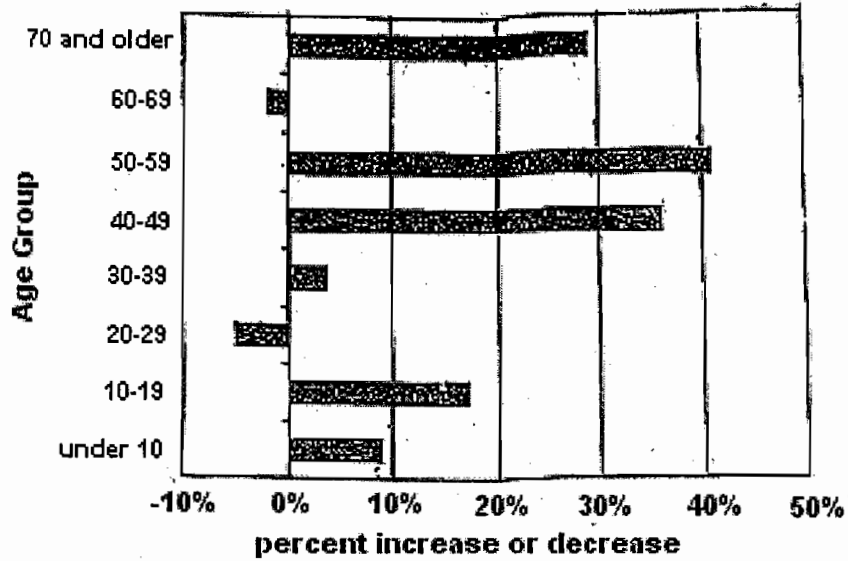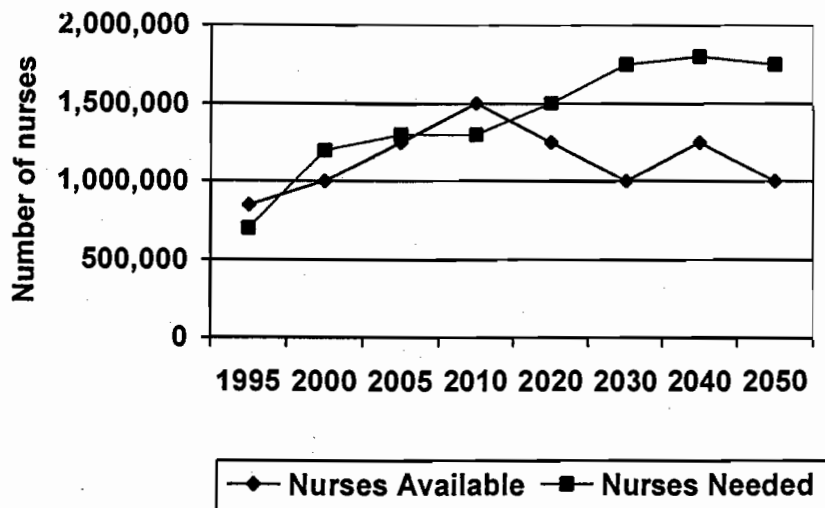## Population Change by Age Group in the United States
1990 - 2000

Figure 2

Nursing Supply & Demand in the United States
1995-2000 (projected)

Reading and graph interpreting exercise #3
POPULATION AGING AND THE NURSING SHORTAGE.

The article deals with the "graying of America"; an occurrence by which the population growth among the elder is disproportionate when compared to other age groups. The author discusses its affect on the healthcare system, most notable on the occupation of nursing.

Paragraph 1, sentence 2:
The greatest gains in the population age structure occurred among those aged 40 and over,...

In the first paragraph the author asserts that age groups of 40 and over experienced the greatest gains in population. Figure 1 clearly supports this claim by showing that the greatest percent increase in population occurred in the 50-59, 40-49 and 7-and older age groups, in that order, with each growing more than 25%. However, this claim might suggest that all age groups about 40 experienced an increase in population, yea Figure 1 shows that the 60-69 age group experiences a *decrease* in population.

"while those under 40 actually experienced a population reduction.

Figure 1 directly refutes this claim by showing that all age groups under 40 except 20-29 actually showed a percent *increase* in population. In fact, the 10-19 age group experiences almost a 20% increase.

Paragraph 3, sentences 1 and 2:
The need for persons in health-related occupations will steadily rise..."

Figure 2 supports this claim by showing a generally rising need for nurses in the coming half-century, particularly during the years 2010-2030 when the need will increase by about 500,000. However, the claim that the need is *steadily rising* is somewhat misleading since Figure 2 shows that between 2005 and 2010 there is no projected increase at all.

"...there will be a progressively greater shortage of nurses..."

The article refers to a current shortage in nurses, and this is clearly indicated by Figure 2, which shows that at the current time there are several hundred thousand fewer nurses available than needed. The claim, however, that the shortage is *progressively greater* is to some extent contradicted by Figure 2, which shows that between 2005 and 2015 there will actually be a *surplus* of nurses. Figure 2 also shows that the shortage will lessen a bit between 2030 and 2040.

It should also be pointed out that in the second paragraph the author claims that the rise in the average of nurses, couples with the slowing rate of workers entering the nursing profession, raises serious questions about the ability of our healthcare system to meet future needs. Figure 1 and Figure 2 address neither of these claims. Figure 2 only deals with the supply and demand of nurses; it never mentions the average age of nurses or the rate at which workers enter the work force.