

## REAL ESTATE MATHEMATICS

Scales

### GENERAL

The importance of mathematics to the real estate broker or salesperson cannot be overemphasized. Virtually no transaction can be completed without some computations. The ability to accurately perform necessary mathematical calculations is an integral part of the skill and competency of a real estate licensee.

This chapter is intended to be a review of the basic arithmetic calculations typically encountered by the real estate licensee. Each section includes an explanation of a specific type of calculation, examples illustrating its application to real estate situations and several practice problems. You are encouraged to consider additional applications and different factual situations to supplement those presented here. Such practice can be a valuable self-testing technique and should pay dividends in improved effectiveness as a real estate professional.

The most difficult part of any arithmetic problem is not in the calculation (since you have the use of a calculator), but in defining the problem, extracting the pertinent information and selecting the proper formulas or rules to arrive at the correct solution.

### CALCULATORS

The real estate licensing examination permits use of a calculator, if certain rules are followed. The calculator must be silent, battery-operated, without paper tape printing capabilities, and must not have an alphabetic key pad. A calculator capable of the four basic functions: addition, subtraction, multiplication and division, is adequate. When choosing a calculator, you should look for two other important features: (1) a percent key, and (2) "sequential capability"—the ability to perform a number of different calculations in sequence before arriving at a final answer.

The math problems discussed in this chapter assume the use of a common, inexpensive calculator that does not have an "enter" key, but does have an "equal" key. "Algebraic logic" is the lofty term used to describe calculators which have been programmed in this manner. Essentially, it means they have been formatted to solve problems by working in a straight line, using normal thought patterns ( $4 + 2 =$ ;  $4 - 2 =$ ;  $4 \times 2 =$ ;  $4 \div 2 =$ ).

### Using the Calculator

The secret to using the electronic calculator is to write the problem in a straight line. Answers are then automatic. For example:

Addition:	$435 + 50 = 485$
Subtraction:	$435 - 50 = 385$
Multiplication:	$435 \times 50 = 21,750$
Division:	$435 \div 50 = 8.7$

Note that in each of the above examples, the numbers were entered into the calculator in a straight line and the "=" key was depressed to arrive at the solution. Hereafter when you see the equal key in parentheses (=), it indicates that the equal key has not been depressed.

## Using the Percent Key

$$\begin{aligned} 435 + 20\% (=) 522 \\ 435 - 20\% (=) 348 \\ 435 \times 20\% (=) 87 \\ 435 \div 20\% (=) 2,175 \end{aligned}$$

Notice that the "=" key was not used in the above examples. The calculator displayed the solution after the "%" key was depressed.

The percent key eliminates the need to change a percent to its decimal equivalent before making a calculation. If you wanted to find the annual interest payments on a \$100,000 loan at a rate of 9% without using the percent key, you would have to convert 9% to its decimal equivalent (.09), enter  $100,000 \times .09$ , and depress the "=" key to arrive at the solution, \$9,000.

When using the percent key, you just enter  $100,000 \times 9\%$  and the solution (9,000) will appear in the display. (Some calculators may require you to depress the "=" key after the "%" key, but the need to convert the percent to its decimal equivalent has still been eliminated.)

## Sequential Calculations

Most calculators, even the simplest, least expensive ones, include a feature that allows you to perform an uninterrupted series of calculations in a desired sequence.

Example:  $25 + 20 - 15 \times 5 \div 4 = 37.5$

Example:  $30 + 20 - 10 \times 8 \div 5 \times 12\% (=) 7.68$

In the second example, if your calculator does not automatically display 7.68, depress the "=" key for the solution.

## ARITHMETIC REVIEW

Nearly all of the mathematical problems encountered in real estate deal with decimal or percentage numbers. A brief review of the fundamentals involved in such problems follows.

### I. Fractions appear in different forms, depending on the use that is made of them.

- A. Fractions such as  $1/2$ ,  $1/3$ ,  $2/3$  and  $5/6$  are known as **common fractions**. They are for everyday common use. For example, a person buys  $1/2$  of an acre of land, or measures a board to sixteenths of an inch.
- B. Fractions in the decimal form, as 0.8 or 0.07 or 0.135, are known as **decimals**. They are for precise measurement.
- C. Fractions in the percent form are the fractions of business and are very much like decimal fractions. The sign for this way of writing hundredths is %. Thus, we can see the sign that means hundredths in place of the decimal that shows hundredths.  $7 \div 100 = .07 = 7\%$ . Because a percent is a decimal whose denominator is 100, you can write a decimal as a percent, or a percent as a decimal. You can also write a percent as a common fraction or a common fraction as a percent, provided you can express it with 100 as the denominator.
  1. To change a decimal to a percent, move the decimal two places to the right, and write the sign (%) for percent. Thus  $.08 = 8\%$ .
  2. To change a percent to a decimal, drop the percent sign and move the point two places to the left. Thus  $65\% = .65$ ;  $2\% = .02$ .
  3. To change a fraction to a percent, divide the numerator (top number) by the denominator (bot-

tom number), then move the point two places to the right and write the sign (%) for percent.

$$1/2 = 1 \div 2 = 0.5 = 50\%$$

$$1/8 = 1 \div 8 = .125 = 12.5\%$$

**II. The application of these fundamentals is not difficult.**

- A. To find the percent of a number, multiply the number by the percent. Example: Brown saves 15% of his salary, which is \$18,000 per year. How much does he save each year?

$$18,000 \times 15\% (=) \$2,700$$

- B. To find what percent one number is of another, the number asked about is the dividend (numerator) of the division problem. Example: 20 is what percent of 25? When you write the problem, place 20, the number asked about, in the dividend.  $20 \div 25 = .80$  or 80%.

**III. Base, Rate and Part**

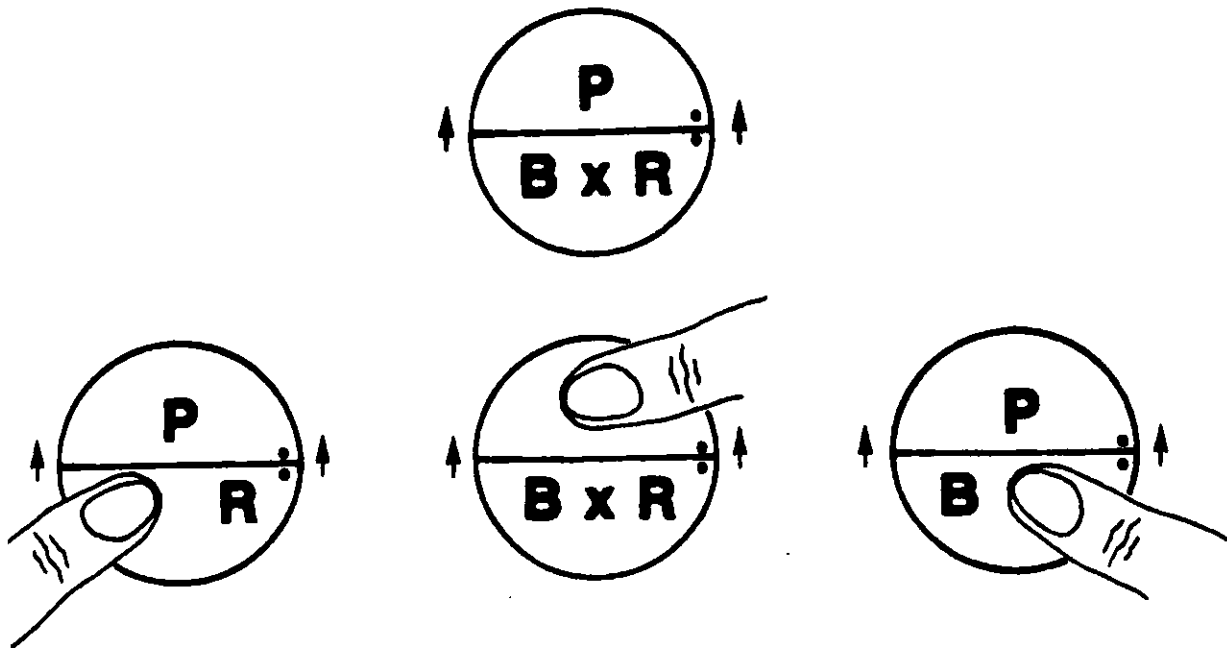
- A. The area of main interest to understand in real estate mathematics is that dealing with base, part and rate. Every percentage problem contains these three elements. (Technically "part" should be called "percentage.")
- B. Given any two of these elements the unknown one can be found by using one of the following formulas:

$$\text{BASE} = \text{PART} \div \text{RATE}$$

$$\text{PART} = \text{BASE} \times \text{RATE}$$

$$\text{RATE} = \text{PART} \div \text{BASE}$$

The following mnemonic (memory device) will prove helpful in solving problems dealing with percent and provides the same information as the above equations.



**To Find Base  
(Divide Part by Rate)**

**To Find Part  
(Multiply Base X Rate)**

**To Find Rate  
(Divide Part by Base)**

### Identifying the Missing Element

Obviously, little is achieved by learning the formula if you cannot identify the missing element. On the other hand, if you learn the formula and you can identify the missing element, the solution becomes easy.

Identification of RATE rarely presents a problem, because the question generally states "tax rate," "interest rate," etc. If the word "rate" does not appear, look for a fraction, a decimal or a percent (1/5, .20, 20%), as RATE must always be expressed in one of these ways.

The BASE is the whole amount being dealt with in a particular problem. For example, in a mortgage problem the BASE is the amount of the loan (principal). The mortgage payments will be a PART of the loan. In a tax problem the BASE amount is the assessed valuation. The annual taxes will be a PART of the assessed value. In a sale price problem the BASE is the selling price and the PART will be the commission.

Typical terms used when applying the relationship to problem situations are:

BASE	PART	RATE
Selling Price	Commission	Rate of Commission
Depreciable Base	Depreciation	Rate of Depreciation
Investment	Net Income Per Year	% of Return
Investment	Profit (Loss)	% of Profit (Loss)
Principal	Interest Per Year	Rate of Interest
Assessed Value	Annual Taxes	Tax Rate
Amount of Insurance	Annual Premium	Insurance Rate

### Common Unit of Expression

In all arithmetic problems, the units used in the calculation must be the same. Inches cannot be multiplied by feet, nor can feet be multiplied by inches. Annual rates cannot be divided into monthly payments nor can monthly payments be divided by annual rates of interest. You must either change inches to feet, or feet to inches; monthly payments to annual payments or vice versa; and so on.

Now consider these examples:

A house and lot are selling for \$200,000. The lot is valued at \$50,000. The lot value is what percent of the selling price? The BASE in this example is the selling price. The PART is the value of the lot.

$$\begin{array}{rclcl} \text{Part} & \div & \text{Base} & = & \text{Rate} \\ \$50,000 & \div & \$200,000 & = & .25 = 25\% \end{array}$$

A rate is usually expressed as a percent. Remember that percent means "per hundred." In the above example the lot is valued at 25% of the total selling price; or you could say the house is 75% of the selling price.

Try these practice exercises in finding percents.

1. PART = 2      BASE = 5      RATE = ?
2. PART = 1      BASE = 8      RATE = ?
3. PART = 30     BASE = 50     RATE = ?

Solutions:

1.  $2 \div 5 = .4 = 40\%$
2.  $1 \div 8 = .125 = 12.5\%$
3.  $30 \div 50 = .6 = 60\%$

In some problems the RATE will be given and either the PART or the BASE will be unknown. To find the PART, do the following:

$$\text{BASE} \times \text{RATE} = \text{PART}$$

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Example:

A farmer had 40 acres of land for sale. Brown bought 20% of the farm. You can find the number of acres purchased (the PART) by multiplying the total area (the BASE) by the percent (RATE).

$$\begin{aligned} \text{Brown's Purchase} &= \text{Total Area} \times \text{RATE} = \text{PART} \\ 40 \text{ acres} \times 20\% & (=) 8 \text{ acres} \end{aligned}$$

Example: A lot was selling for \$40,000. Greene bought it for \$30,000. What was the percent of discount?

In this case you are looking for the RATE. The selling price (\$40,000) is the BASE and the discount (\$10,000) is the PART. To find the RATE, this is what you have to do:

$$\begin{aligned} \text{PART} \div \text{BASE} &= \text{RATE} \\ 10,000 \div 40,000 &= .25 = 25\% \end{aligned}$$

Example:

A certain property is being depreciated at the rate of 5% per year. The amount of depreciation this year is \$6,000. What is the value upon which this depreciation is based?

In this case we are looking for the BASE. The depreciation (\$6,000) is the PART and the 5% is the RATE.

$$\begin{aligned} \text{PART} \div \text{RATE} &= \text{BASE} \\ \$6,000 \div 5\% & (=) \$120,000 \end{aligned}$$

**Commission**

The importance of being able to calculate one's commission need not be stressed. The general formula for determining commission is:

$$\begin{aligned} \text{Gross Sale Price} \times \text{Rate of Commission} &= \text{Commission} \\ \text{(BASE)} \quad \quad \quad \text{(RATE)} \quad \quad \quad \text{(PART)} \end{aligned}$$

Example:

A broker is to receive a 5% commission on a \$200,000 sale. What commission will the broker receive?

$$\begin{aligned} \text{(BASE)} \quad \times \quad \text{(RATE)} &= \quad \text{(PART)} \\ \$200,000 \times 5\% & (=) \quad \$10,000 \end{aligned}$$

Now try these practice problems. Check your answers with the solutions given at the end of this section.

1. The 5% commission received by a broker at closing was \$9,000. What was the gross sale price of the lot sold?
2. The broker received a commission of \$18,600 on a sale price of \$310,000. What was the broker's rate of commission?
3. The owner would like to receive \$60,000 net after sale of a lot. She agrees to pay the broker a 6% commission. For what amount must the broker list the property in order for the owner to net \$60,000?
4. A broker is to be paid a commission of 7% on a sale of a \$175,000 property:
  - a. How much will the broker receive?
  - b. The broker will retain 50% of the commission, 20% will go to the listing salesperson and 30% to the selling salesperson. How much will the salespersons get as a result of this sale?
5. A property manager has contracted with a client to receive 5% of the gross rents collected. The proper-

ty is a three-family, with two units renting for \$500 per month and one unit for \$600 per month. What monthly commission will the broker receive if all three units are rented for the entire month?

Solutions:

1.  $\$9,000 \div 5\% (=) \$180,000$
2.  $\$18,600 \div \$310,000 = .06 = 6\%$
3. If the owner nets \$60,000 after paying a 6% commission, then \$60,000 is 94% of the sale price.  
 $\$60,000 \div 94\% (=) \$63,830$
4. a.  $\$175,000 \times 7\% (=) \$12,250$   
 b. Seller's Commission:  $\$6,125 \times 30\% (=) \$1,837.50$  Lister's Commission:  $\$6,125 \times 20\% (=) \$1,125$
5.  $\$1,600 \times 5\% (=) \$80$

**Depreciation**

The value of property usually fluctuates over time. Factors which influence property values include physical wear and tear, damage, obsolescence, inflation, neighborhood changes, supply and demand and so on.

**Depreciation** refers to an allocation procedure which may be used for any of three purposes:

- A. As one factor in determining the market value of a building (replacement cost less an allowance for years of use).
- B. Determining a deductible amount for income tax purposes.
- C. Determining the book value of a structure for accounting purposes. The topic of depreciation may well require several chapters in an accounting textbook. The purpose here is to review the basic computational methods involving percents. For a more detailed discussion of depreciation methods, consult the appropriate tax manual or accounting text.

The simplest method of depreciation is called the "straight line" method. Using this method, the depreciation is spread evenly over the estimated life of the property. In the case of improved properties, depreciation is computed only on physical structures (buildings), never on the land itself.

Example:

A 10-year-old residence is totally destroyed by fire. At present prices, the building will cost \$150,000 to replace. If the house had a useful life of 40 years when it was built, how much has it depreciated?

$\frac{\$}{\text{X}}$	Base Cost	x	Percent of Remaining Life	=	Depreciation
	\$150,000	x	25% (10 yrs $\div$ 40 yrs.)	(=)	\$37,500

(Note that the original purchase price was not considered, nor was the price of the land.)

In the example above, the annual depreciation rate is 1/40th of the total cost or 2.5%. Thus the house is determined to have depreciated in value \$3,750 for each year of its 10-year life. The accumulated depreciation is therefore \$37,500 or 25% of the current replacement cost.

Example:

A duplex is purchased for income purposes at a cost of \$90,000. The value of the land is determined to be \$6,000. If tax guidelines allow an annual deduction of 2.5% for depreciation on this particular type of rental property, what deduction may be taken for depreciation this year?

$$\begin{array}{rcl} \text{Depreciable Base} \times \text{Rate of Depreciation} & = & \text{Deduction} \\ \$84,000 \times 2.5\% & (=) & \$2,100 \end{array}$$

(Note that the value of the land was deducted from the original cost to determine the depreciable base.)

Try these practice problems :

1. A rental property was purchased for \$135,000. The land was valued at \$27,000. The owner claimed a depreciation deduction of \$2,700 for income tax purposes this year. What rate of depreciation is he using?
2. A 26-year-old building is being depreciated by the straight-line method over an estimated 39-year life. The accumulated depreciation has decreased the book value of the building to \$210,000. What was the original construction cost of this building?
3. A building is being depreciated at a rate of 4% per year. The amount depreciated this year was \$5,000. What is the value upon which this depreciation is based?
4. The book value of a building is \$270,000. It was constructed five years ago at a cost of \$360,000. What was the yearly rate of depreciation?

Solutions:

1.  $\$135,000 - \$27,000 = \$108,000$  Building Value  
 $\$2,700 \div \$108,000 = .025 = 2.5\%$
2.  $13 \div 39 = .333$   
 $\$210,000 \div 33.3\% (=) \$630,000$  Original Cost
3.  $\$5,000 \div 4\% (=) \$125,000$  Value
4.  $\$360,000 - \$270,000 = \$90,000$  Total Depreciation  
 $\$90,000 \div 5 \text{ years} = \$18,000$  Yearly Depreciation  
 $\$18,000 \div 360,000 = .05 = 5\%$  Per Year Depreciation

## Annual Return on Investment and Capitalization

### A. Annual Return on Investment

Anyone considering an investment in property will be interested in determining the rate of return that can be expected from that investment. The rate of return is the relationship between the investment and the net income it produces each year. The formula used to calculate the rate of return on an investment is:

$$\frac{\text{Annual Net Income}}{\text{(PART)}} \div \text{Investment} = \text{Rate of Return} \text{ (RATE)}$$

It is important to use the annual net income in this calculation. The net income is calculated by deducting all of the owner's property chargeable expenses from the gross income. Such expenses include real estate taxes, insurance, maintenance, utilities and other operating expenses.

An understanding of the relationship between gross income, net income, investment and rate of return is essential if you are to deal with questions which are frequently asked in real estate transactions, such as:

- "How much rent must I charge in order to get a 10% rate of return per year?"
- "How much must I invest to provide an annual net income of \$20,000 at a rate of 9%?"

### B. Capitalization

In appraising the value of an investment, the capitalization rate serves a function very much like an interest rate. Just as savers will not be attracted to a bank offering 5% interest if other banks are giving 6%

interest, informed investors are not likely to invest in property returning 8% if the market capitalization rate is 10%.

Methods used to determine the capitalization rate for a given property are beyond the scope of this chapter, but keep in mind that it is a composite of several factors, including a rate of return ON an investment and a rate of return OF the investment through depreciation.

The general formula for calculating the value of a property given the capitalization rate is:

$$\frac{\text{Annual Net Income}}{\text{PART}} \div \frac{\text{Capitalization Rate}}{\text{(RATE)}} = \frac{\text{Value}}{\text{(BASE)}}$$

Example:

Brown owns an apartment building. His net income from the property is \$36,000, which represents a 12% return on his investment. How much has he invested in the property?

$$\frac{\text{Net Income}}{\$36,000} \div \frac{\text{Rate of Return}}{12\%} = \frac{\text{Investment}}{(\$300,000)}$$

Example:

Green wants to invest in income property. She wants a rate of return of at least 12%. Will she be interested in a property priced at \$125,000 which produces a yearly net income of \$9,000?

$$\frac{\text{Net Income}}{\$9,000} \div \frac{\text{Investment}}{\$125,000} = \frac{\text{Rate}}{.072 = 7.2\%}$$

Practice Problems:

1. Milligan bought a rental property for \$350,000. The rent for each of the four units is \$1,200 per month and each unit is rented for the entire year. Expenses on the building average \$875 per month and taxes are \$6,500 per year. What is the annual rate of return on this property?
2. If a business property valued at \$350,000 earns 12% on the total investment annually, what is the monthly income?
3. Travers owns a property valued at \$180,000. Her annual gross income from renting it to Mr. and Mrs. Peters is \$21,840. Her rate of return is 8%. What is the amount of her annual expenses?

Solutions:

1. Gross Income =  $4 \times 12 \times \$1,200 = \$57,600$   
Expenses =  $\$875 \times 12 + \$6,500 = \$17,000$   
Net Income =  $\$57,600 - \$17,000 = \$40,600$   
 $\$40,600 \div \$350,000 = .116 = 11.6\%$  Rate of Return
2.  $\$350,000 \times 12\% (=) \$42,000$  Net Income Per Year  
 $\$42,000 \div 12$  months = \$3,500 Monthly Income
3.  $\$180,000 \times 8\% (=) \$14,400$  Net Income  
 $\$21,840 - \$14,400 = \$7,440$  Expenses

## PROFIT OR LOSS PROBLEMS

"If we sell at that price, we will make 20% over our cost."

"How much do I have to sell my home for in order to make a 15% profit?"

"If I sell for \$20,000 instead of \$25,000, what percent will I lose?"



Often a seller wants to know what profit or loss he will realize by selling a parcel of real estate at a given price. Frequently a sale will not even be made if a certain profit will not be realized or if a loss will occur. The broker is also interested in profit and loss figures because maximizing profit or minimizing loss is one way to promote a principal's interest.

The general formula for profit and loss rates is:

$$\text{Original Investment} \times \% \text{ of Profit (Loss)} = \text{Profit (Loss)}$$

Example:

A lot was purchased for \$25,000 and sold for \$32,500. What percent of profit was made on the sale?

$$\begin{aligned} \$32,500 - \$25,000 &= \$7,500 \text{ Profit} \\ \$7,500 \div \$25,000 &= .3 = 30\% \text{ Profit} \end{aligned}$$

It is important to remember that the calculation compares the amount of profit to the ORIGINAL INVESTMENT. Sometimes the selling price will be given and the percent of profit or loss. In such situations, it is best to think of the original cost and selling price in terms of percents before calculating.

Example: If there is a 15% profit, then think:

$$\begin{array}{rcl} \text{Original Cost} + \text{Profit} & = & \text{Selling Price} \\ 100\% + 15\% (=) & & 115\% \end{array}$$

or, if there is a 15% loss:

$$\begin{array}{rcl} \text{Original Cost} - \text{Loss} & = & \text{Selling Price} \\ 100\% - 15\% (=) & & 85\% \end{array}$$

Example:

If Barry sold a lot for \$48,000 and made a 20% profit, what was Barry's original cost?  
Original Cost (100%) + Profit (20%) = Selling Price.  $100\% + 20\% = 120\%$ .

Now that you have calculated the proper rate, you can calculate the original cost.

$$\$48,000 \div 120\% (=) \$40,000 \text{ Original Cost}$$

Try these practice exercises:

1. Mary bought a property for \$34,000 and sold it one year later at a 10% profit. What was the selling price?
2. Jack Green, a broker, has a property listed at \$35,000. Jim Black purchases it for \$32,500 and later sells it for \$30,000. What percent of loss did Jim take on the exchange?
3. The Gardners recently sold a lot for \$25,200. This was a 5% profit over their original cost. How much did they pay for the home originally?

Solutions:

1.  $\$34,000 \times 110\% (=) \$37,400$  Selling Price
2.  $\$2,500 \div \$32,500 = .0769 = 7.69\%$  Loss
3.  $\$25,200 \div 105\% (=) \$24,000$  Original Cost

**INTEREST**

Few real estate buyers are able to purchase a home without the use of money borrowed from a bank, savings and loan association or other financial source. The rent paid by the borrower for the use of borrowed funds is called interest. This charge is usually expressed as a rate or percent, and is an annual rate unless otherwise indicated. Thus, reference to "interest at 9%" means that the borrower will be charged \$9 interest for each \$100 borrowed for a 12-month period.

The type of interest calculation usually used in real estate transaction is called simple interest. Using this method of calculation, interest is charged only on the unpaid balance of the principal.

The formula for simple interest is:

$$\text{Principal} \times \text{Rate of Interest} \times \text{Time} = \text{Interest}$$

This formula differs from others in this section because of the "Time" factor. You need this factor to calculate interest for periods other than one full year.

Example:

The amount of a loan is \$4,000 and the annual rate of interest is 9%. How much interest will be paid on the loan in one year?

$$\begin{aligned} \text{Principal} \times \text{Rate} \times \text{Time} &= \text{Interest} \\ \$4,000 \times 9\% \times 1 &= \$360 \end{aligned}$$

What if the loan is to be paid off in two months? Since two months is 2/12 of a year, the interest charged should be 2/12 or 1/6 of the yearly interest. You can calculate this as follows:

$$\begin{aligned} \text{Principal} \times \text{Rate} \times \text{Time} &= \text{Interest} \\ \text{Interest} &= \$4,000 \times 9\% \times 1 \div 6 (.1666) \\ \text{Interest} &= \$360 \times .1666 \\ \text{Interest} &= \$60 \end{aligned}$$

The period of a loan may be for a certain number of days. The business world generally considers a year to have 360 days when calculating interest. The 360-day year is commonly known as a "business year" or a "banker's year." The United States government calculates interest based on a 365-day year. Interest calculated using a 365-day year is called "accurate" or "exact" interest. Whether a 360- or 365-day year is used in the calculation of interest may be a matter for negotiation between the parties to a transaction. For exam purposes a business year is used.

Calculate the interest for 35 days on the \$4,000 loan in the previous example, using a business year.

$$\begin{aligned} \text{Interest} &= \text{Principal} \times \text{Rate} \times \text{Time} \\ \text{Interest} &= \$4,000 \times 9\% \div 360 \times 35 \\ \text{Interest} &= \$4,000 \times 9\% \times 1 = \$35 \end{aligned}$$

Now try these practice exercises:

1. If the rate of interest is 7% per annum and the quarterly interest payments are \$525.00, what is the amount of the loan?
2. \$2,000 is borrowed at 9% interest per year. The loan is made on May 1 and is to be paid back on August 31. Compute the interest charge based on a business year.

Solutions:

1.  $\$525 \times 4 = \$2,100$   
 $\$2,100 \div 7\% (=) \$30,000$
2.  $\$2,000 \times 9\% (=) \$180$   
 $\$180 \times 1/3 (.333) = \$60$

## PRORATION

At the time a sale of property is closed, there may be certain financial benefits and/or responsibilities which will pass from seller to buyer along with the property. It is important that such benefits and responsibilities be allocated to the parties involved in proportion to the time they owned or will own the property. The calculation involved in allocating these benefits and responsibilities properly is called proration.

The following are examples of items which must be prorated in closing a real estate transaction: real estate taxes, insurance premiums, rents, and water and utility bills.

In New Jersey prorations are made up to and including the day of closing. The seller is responsible for the day of closing and the buyer becomes responsible the day after closing. Use a 30-day month for all calculations.

### A. Real Estate Taxes

Property taxes become a lien on January 1. Taxes are due quarterly on the 1st day of February, May, August and November. If taxes are owed, you must determine the number of months and days in the tax year(s) for which the seller has not paid taxes. Such charges will be prorated as a credit to the buyer and a debit to the seller.

Example:

The annual property taxes for the current year were \$6,400 and were unpaid. The property was sold and the transaction closed on August 20. What amount in taxes should be credited to the buyer and debited to the seller?

The seller owes taxes for 7 months and 20 days. Therefore, the prorated taxes are \$4,087 (credit buyer; debit seller).

$$\begin{aligned} \$6,400 \div 360 \text{ days} &= \$17.77 \text{ per day} \\ \$17.77 \times 230 \text{ days} &= \$4,087 \end{aligned}$$

### B. Insurance Premiums

Existing insurance policies are seldom transferred to the buyer, but when they are, the buyer will reimburse the seller for the prepaid premiums by way of a credit on the closing statement. This amount is computed from the day of closing through the date of expiration of the policy.

Example:

A property settlement takes place on May 20, 2009. An existing homeowners policy, written for five years on October 14, 2006, is to be transferred to the buyer. The paid-up premium was \$1,080. Determine the amount of premium that should be credited to the seller and debited to the buyer.

Solution:

The policy expires October 14, 2011, so the buyer is covered for 28 months plus 24 days (864 days), May 20, 2009 thru October 14, 2011.

$$\begin{aligned} \text{Yearly Premium} &= \$1,080 \div 1,800 \text{ days} = \$0.60 \text{ per day} \\ \text{Prepaid Coverage: } &864 \text{ days} \times \$0.60 \text{ per day} = \$518.40 \text{ (credit seller; debit buyer)} \end{aligned}$$

### C. Practice Exercises

The owner of a property contracts with a broker to sell a property for \$250,000 and agrees to pay a commission of 5% on the selling price. The closing date is September 15, 2002. Use this information to answer the following questions:

1. What is the amount of commission due the broker?
2. If the seller has not paid the 2002 taxes of \$3,600, what amount will be prorated as a credit to the buyer and a debit to the seller?
3. The property is insured through February 5, 2003 for 90% of the current selling price. The prepaid three-year premium was \$17.60 per \$1,000. What is the amount that will be credited to the seller and debited to the buyer?

Solutions:

1.  $\$250,000 \times 5\% (=) \$12,500$
2. Total time seller owned property in 2002 = 8.5 months (255 days)  
 $\$3,600 \div 360 \times 255 = \$2,550$
3.  $\$250,000 \times 90\% (=) \$225,000$  (amount of policy)  
 $225 \times \$17.60 = \$3,960$  (3-year premium)  
 $\$3,960 \div 1,080 \text{ days} = \$3.66$  (daily premium)

Total number of days covered beyond September 15, 2002:

2002 - 105  
 2003 - 35  
 140 days (unused)

$\$3.66 \times 140 = \$512.40$

### Property Taxes

The major source of local government revenue is the property tax. Knowledge of how this tax is computed is extremely important to the real estate broker or salesperson. The first step in the process is an appraisal of the market value of the property by the local tax assessor. It is assumed that this appraisal is uniform throughout the district and free of bias. Procedures for appeal are available to the property owner who feels that his property value has been appraised too high.

Example:

A municipality requires a total revenue from property tax of \$3,987,000. The assessed valuation of all property in the district is \$45,986,000. The tax rate for that municipality is computed as follows:

$$\begin{array}{r} \text{Total Tax Levy} \div \text{Total Assessed Valuation} = \text{Tax Rate} \\ 3,987,000 \div \quad \quad \quad \$45,986,000 \quad = \quad \$0.087 \end{array}$$

The tax rate in New Jersey is generally expressed as an amount "per hundred dollars." Therefore, in the example above, the tax rate would be expressed as \$8.70 per \$100.

Practice Exercises:

1. A property is assessed at \$120,000. The tax rate is \$5.40. What are the annual taxes on this property?
2. The annual taxes on a house are \$5,300. The tax rate is \$4.60. What is the assessed valuation?
3. Assessed valuation is \$24,000; taxes are \$811.20. Determine the rate.

Solutions:

1. Assessed Valuation  $\div$  100  $\times$  Tax Rate = Annual Taxes  
 $\$120,000 \div 100 = 1,200 \times \$5.40 = \$6,480.$

2. Annual Taxes ÷ Tax Rate = Assessed Valuation  
 $\$5,300 \div 4.6\% = \$115,217$
3. Annual Taxes ÷ Assessed Valuation = Tax Rate  
 $\$811.20 \div \$24,000 = .0338 \times 100 = \$3.38$  per hundred (3.38%)

## Home Mortgages

Few people pay the purchase price of a piece of property outright. The most common means of payment is a mortgage plan from a lending institution. The **mortgage** is a contract in which the borrower pledges the property as security for the loan and promises to repay the money. Almost all mortgage contracts call for repayment in equal monthly payments (called **amortizing** the mortgage). As payments are made, they are applied first to the interest due and then to reduce the unpaid balance (principal).

The monthly payment a mortgage will require is often a major factor in a prospective buyer's decision, so you will frequently be called upon to compute the amount needed to amortize the mortgage. An invaluable aid in such computations is an amortization chart such as the one shown on the next page.

Example:

A loan of \$1,000 at 7% interest to be paid off in 30 years will require monthly payments of \$6.66 per \$1,000. What monthly payments would be needed to amortize a 30-year mortgage of \$150,000 at 7% interest?

Since the monthly payment per \$1000 is \$6.66 (taken from the amortization chart on the next page), simply multiply the number of thousands (150 in this example) by \$6.66. The payment needed is \$999.00.

Another question that frequently arises in real estate transactions is how much of the monthly payment goes to pay interest due and how much goes to reduce the premium. The lending institution will prepare a complete loan payment schedule for the mortgagor, but you should understand the principles involved.

Continuing the example of a \$150,000 mortgage at 7% for 30 years, calculate how much of the first payment goes for interest.

$$\begin{aligned} \text{Principal} \times \text{Rate} \times \text{Time} &= \text{Interest} \\ \$150,000 \times 7\% \times 1 \div 12 &= \$875 \end{aligned}$$

The balance of the \$999.00 payment (\$124.00) is used to reduce the principal:

$$\text{New Principal} = \$150,000 - \$124 = \$149,876$$

The calculations for the second month are:

$$\begin{aligned} \text{Interest} &= \$149,876 \times 7\% \times 1 \div 12 = \$874.27 \\ \text{Payment on Principal} &= \$124.73 \end{aligned}$$

The following chart shows the first five monthly payments on a loan schedule to amortize a \$150,000 loan at 7% for 30 years:

No.	Monthly Payment	Payment on Interest	Payment on Principal	Principal Balance
1	999.00	875.00	124.00	149,876
2	999.00	874.27	124.73	149,751
3	999.00	873.55	125.45	149,626
4	999.00	872.82	126.18	149,500
5	999.00	872.08	126.92	149,373

**AMORTIZATION CHART**  
**Monthly Payment Per \$1,000**

Years	5%	6%	7%	8%	9%	10%	11%	12%
1	85.61	86.07	86.53	86.99	87.45	87.92	88.39	88.85
2	43.87	44.32	44.78	45.23	45.69	46.15	46.61	47.08
3	29.97	30.42	30.88	31.34	31.80	32.27	32.74	33.22
4	23.03	23.49	23.95	24.41	24.89	25.36	25.85	26.34
5	18.87	19.33	19.81	20.28	20.76	21.25	21.74	22.25
6	16.10	16.57	17.05	17.53	18.03	18.53	19.04	19.55
7	14.13	14.61	15.10	15.59	16.09	16.60	17.12	17.65
8	12.66	13.14	13.64	14.14	14.65	15.17	15.71	16.25
9	11.52	12.01	12.51	13.02	13.54	14.08	14.63	15.18
10	10.61	11.10	11.62	12.13	12.67	13.22	13.78	14.35
11	9.86	10.37	10.89	11.42	11.96	12.52	13.09	13.68
12	9.25	9.76	10.29	10.82	11.38	11.95	12.54	13.13
13	8.73	9.25	9.79	10.33	10.90	11.48	12.08	12.69
14	8.29	8.81	9.36	9.91	10.49	11.08	11.69	12.31
15	7.91	8.44	8.99	9.56	10.14	10.75	11.37	12.00
16	7.58	8.11	8.68	9.25	9.85	10.46	11.09	11.74
17	7.29	7.83	8.40	8.98	9.59	10.21	10.85	11.51
18	7.03	7.58	8.16	8.75	9.36	10.00	10.65	11.32
19	6.80	7.36	7.95	8.55	9.17	9.81	10.47	11.15
20	6.60	7.16	7.76	8.36	9.00	9.65	10.32	11.01
21	6.42	6.99	7.59	8.20	8.85	9.51	10.19	10.89
22	6.25	6.83	7.44	8.06	8.71	9.38	10.07	10.78
23	6.10	6.69	7.30	7.93	8.59	9.27	9.97	10.69
24	5.97	6.56	7.18	7.82	8.49	9.17	9.88	10.60
25	5.85	6.44	7.07	7.72	8.39	9.09	9.80	10.53
26	5.73	6.34	6.97	7.63	8.31	9.01	9.73	10.47
27	5.63	6.24	6.88	7.54	8.23	8.94	9.67	10.41
28	5.54	6.15	6.80	7.47	8.16	8.88	9.61	10.37
29	5.45	6.07	6.73	7.40	8.10	8.82	9.57	10.32
30	5.37	6.00	6.66	7.34	8.05	8.78	9.52	10.29

Multiply the cost per \$1,000 by the amount of the loan (in thousands). The result will be the monthly payment, including principal and interest. For example, for a \$100,000 loan for 30 years at 6%, multiply  $100 \times 6.00 = \$600$ .

Practice Exercises:

- Calculate the monthly payments for each of the following mortgages:
  - \$130,000 at 7% for 20 years.
  - \$140,000 at 7% for 25 years.
  - \$150,000 at 8% for 30 years.
- Wellington has enough for a \$25,000 down payment on a house and can pay \$800 per month toward interest and principal. The interest rate is 7%. If Wellington can obtain a 25-year mortgage, approximately what price range is he looking for?
- Simon bought a house for \$150,000. After making a down payment of \$30,000, he obtained a mortgage loan for the balance at 7% for 25 years.
  - Find the amount of the monthly payment.
  - Make a loan payment schedule for the first five payments.

Solutions:

- \$1,000 at 7% for 20 years requires \$7.76 per month. Payment =  $130 \times \$7.76 = \$1008.80$
  - \$1,000 at 7% for 25 years requires \$7.07 per month. Payment =  $140 \times \$7.07 = \$989.80$
  - \$1,000 at 8% for 30 years requires \$7.34 per month. Payment =  $150 \times \$7.34 = \$1,101$
- \$1,000 at 7% for 25 years requires \$7.07 per month.

He can afford \$800 per month, so divide 800 by 7.07 to find the size of the mortgage. ( $800 \div 7.07 = \$113,000$ ). Maximum loan = \$113,000. Add to this amount his down payment and he is looking in the \$138,000 price range.

- Principal = \$120,000 ( $\$150,000 - \$30,000$ ); Payment =  $120 \times \$7.07 = \$848.40$ .  
 Principal  $\times$  Rate  $\times$  Time = Interest  
 $\$120,000 \times 7\% \times 1 = \$700$

B)

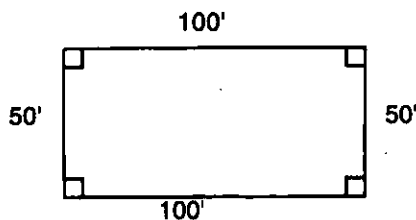
No.	Monthly Payment	Payment on Interest	Payment on Principal	Principal Balance
1	848.40	700.00	148.40	119,851.60
2	848.40	698.13	149.27	119,702.33
3	848.40	696.26	150.14	119,552.19
4	848.40	697.39	151.01	119,401.18
5	848.40	696.51	151.89	119,249.29

PERIMETER, AREA, AND VOLUME

Perimeter (Linear Measurement)

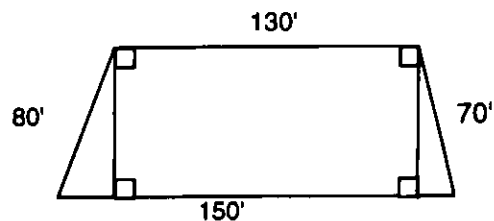
Perimeter is the distance around a figure. To find the perimeter, add the length of all sides.

Example: Compute the perimeter of the following figures:



$$P = 50' + 100' + 50' + 100'$$

$$P = 300'$$



$$P = 80' + 130' + 70' + 150'$$

$$P = 430'$$

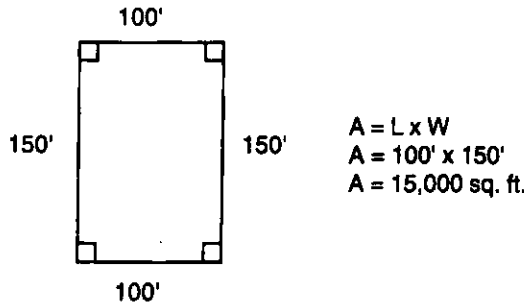
**Area**

Area is the measurement of a flat surface, such as a floor, wall or field. Real estate licensees are frequently called upon to describe a property in terms of its physical dimensions. How large is the lot? How big is the master bedroom? Which house has the larger kitchen? This section will review the basic methods of calculating area measurements to describe a building or lot.

**A. Rectangles**

Any flat surface with four straight sides is called a quadrilateral. The most common quadrilateral is a **rectangle**. The opposite sides of a rectangle are the same length and are parallel to each other, and all corner angles measure 90 degrees. The area of a rectangle can be found by multiplying one side by any other side perpendicular to it.

Formula: Area = Length x Width ( $A = L \times W$ )



Example:

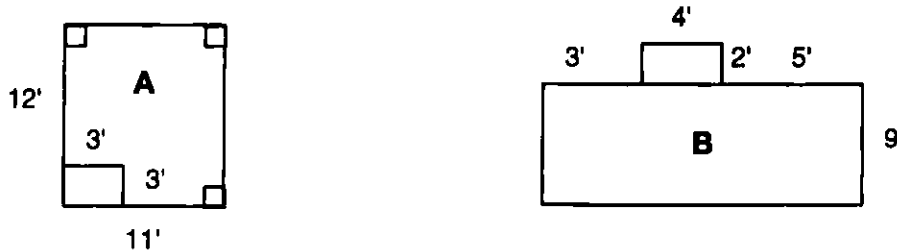
Find the areas of these rooms:

1. Kitchen: 9 ft. x 12 ft.
2. Den: 9 ft. x 8 ft.-6 in.

Solution:

The area of the kitchen is 108 sq. ft. ( $9 \times 12$ ). Before calculating the area of the den, you must express the dimensions with a common unit. For most purposes it will be easier to work with the larger unit, so you should use feet as the common unit in this problem. 8 ft. 6 in. = 8.5 ft.  $9 \times 8.5 = 76.5$ . The area of the den is 76.5 sq. ft.

Sometimes a room will be nearly rectangular, but will have an alcove attached such as the two rooms pictured below.



The dotted lines suggest two methods commonly used to find such areas. For room A, you can compute the large area ( $11' \times 12'$ ) and subtract the "missing" area ( $3' \times 3'$ ). The result is 123 sq. ft. For room B, the method suggested is to add the small area ( $4' \times 2'$ ) to the area of the larger part ( $12' \times 9'$ ). The result is 116 sq. ft.



CHAPTER 25

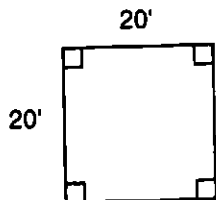
**B. Squares**

A **square** is a flat surface having four equal sides, all of which are parallel, and all corner angles measure 90 degrees. To find the area of a square you multiply one side by any other side.

$$\text{Formula: Area} = \text{Length} \times \text{Width} (A = L \times W)$$

Example:

Find the area of a room that is 20 ft. square.



Solution:

$$20' \times 20' = 400 \text{ square feet.}$$

**Geometric Method**

The geometric method uses a circle to find the area of rectangles and squares. As with percentages, multiply across and divide upward. Note that area is always on the top of the equation (numerator).

$$\text{Area} = \text{Length} \times \text{Width}$$

Example:

A rectangular lot has a frontage of 80 ft. and a depth of 125 ft. How many sq. ft. does it contain?

Solution:

$$\text{Area} = 80' \times 125' = 10,000 \text{ sq. ft.}$$

Example:

A lot containing 21,780 sq. ft. has a frontage of 150 ft. What is its depth?

Solution:

$$\begin{array}{rcl} \text{Area} & \div & \text{Frontage} = \text{Depth} \\ 21,780 & \div & 150 = 145.2 \end{array}$$

Example:

A parcel of land with an area of 14,520 sq. ft. has a depth of 110 ft. What is the frontage?

Solution:

$$\begin{array}{rcl} \text{Area} & \div & \text{Depth} = \text{Frontage} \\ 14,520 \text{ sq. ft.} & \div & 110' = 132' \end{array}$$

**C. Triangles**

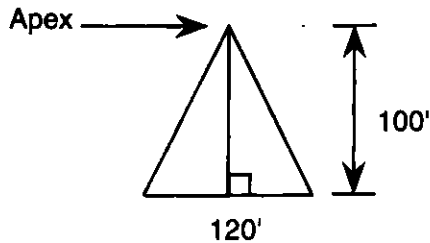
A **triangle** is a figure having three sides and three angles.

**Base:** Either side of a triangle measuring 90 degrees to another side.

**Apex:** The point at which two sloping sides of a triangle intersect.

**Height:** The perpendicular distance from the base of a triangle to the apex.

Formula:  $\text{Area} = 1/2 \text{ base} \times \text{height}$



**Example:**

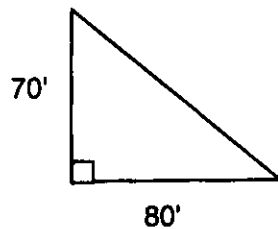
Find the area of a triangle having a base of 120 ft. and a height of 100 ft.

**Solution:**

$\text{Area} = 1/2 \text{ base} \times \text{height}$   
 $\text{Area} = 60' \times 100' = 6,000 \text{ sq. ft.}$

**Example:**

Find the area of a triangle having a base of 80 ft. and a height of 70 ft.



**Solution:**

$\text{Area} = 1/2 \text{ base} \times \text{height}$   
 $\text{Area} = 40' \times 70'$   
 $\text{Area} = 2,800 \text{ sq. ft.}$

#### D. Trapezoids

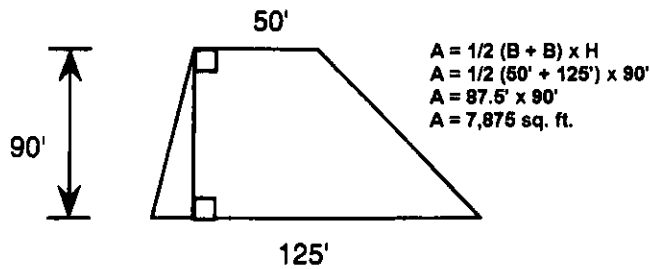
A trapezoid is a figure having four sides, only two of which are parallel and are of different lengths. The area of a trapezoid is computed by taking one-half the sum of the bases and multiplying by the height.

Formula:  $\text{Area} = 1/2 (\text{base} + \text{base}) \times \text{height}$ .

**Base:** Either of the parallel sides of a trapezoid.

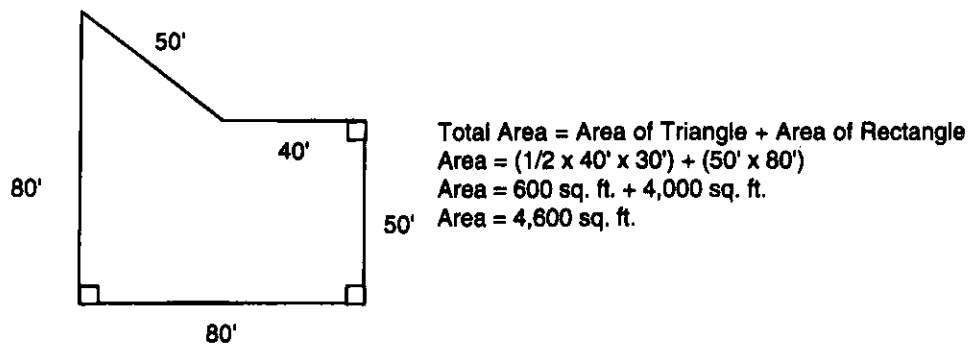
**Height:** The vertical distance between the parallel bases.

Example: What is the area of the following trapezoid?



**E. Irregular Figures**

To find the area of an irregular figure, divide the figure into regions for which you can compute the areas. Then add the areas of each region. Be careful not to overlap.



**F. Circle**

The circumference of a circle is the "distance around" the outside of a circle. The diameter is the distance through the center of a circle to its curve. The radius is the distance from the center of a circle to its curve.



The ratio of the circumference to the diameter is the same for all circles. That is, circumference divided by diameter is a constant number. This constant number is called "Pi" (p). Thus p equals 3.14.

The following formulas are used to determine circumference (C), diameter (D), radius (r), and area (A) of a circle:

Circumference:	$C = \pi \times D$
Diameter	$D = C \div \pi$
Radius:	$r = D \div 2$
Area:	$A = \pi \times r^2$

Example:

Compute the following: (a) circumference, (b) radius and (c) area, of a circular swimming pool having a diameter of 24 feet.

Solution:

(a) Circumference =  $3.14 \times 24' = 75.36$  sq. ft.

(b) Radius =  $24' \div 2 = 12'$

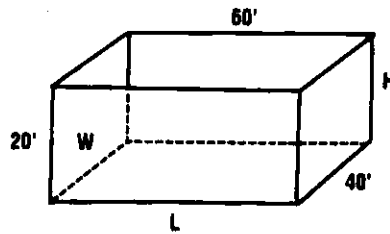
(c) Area =  $3.14 \times 12' \times 12' = 452.16$  sq. ft.

**F. Volume**

Volume adds a third dimension to area measurement, that of height or depth.

The volume of a rectangular space, such as a room, is the product of its length times its width times its height.

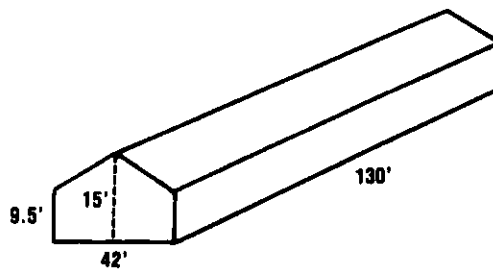
Formula:	Volume	=	Length	x	Width	x	Height
	V	=	L	x	W	x	H
	48,000 cu. ft.		60'		40'		20'



The volume of triangular space such as that in the attic space of a peaked roof can be found by multiplying the area of the triangle by the length of the attic.

Example:

To calculate the cost of providing air conditioning, you must compute the volume of air contained in the building outlined below. Find the volume in cubic feet.



Area = Area of Triangle + Area of Rectangle

Area =  $(1/2 \times 42' \times 9.5') + (9.5' \times 42')$

Area = 115.5 sq. ft. + 399 sq. ft.

Area = 514.5 sq. ft.

$V = A \times H$

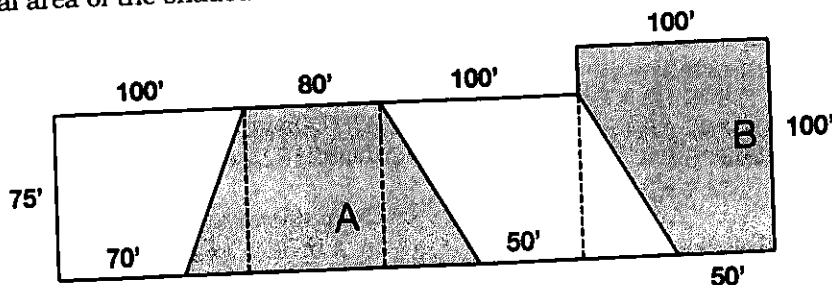
$V = 514.5 \text{ sq. ft.} \times 130'$

$V = 66,885 \text{ cu. ft.}$

CHAPTER 25

Practice Exercises:

1. A house has three rectangular-shaped bedrooms. Their dimensions are: 9' by 13'; 9'6" by 12'; and 11'3" by 10'9". Find the area of each bedroom.
2. A rectangular lot measures 250' by 175'. Find its area in square feet. Express this area as square yards. How does this area compare to an acre?
3. Find the total area of the shaded lots.



Solutions:

1. For the 9' by 13' room the area is  $9' \times 13' = 117$  sq. ft.

For the second room, convert 9'6" to 9.5' before multiplying.  $9.5' \times 12' = 114$  sq. ft.

For the third room, convert both measures to feet:  $11'3" = 11.25'$  and  $10'9" = 10.75'$ .  $11.25' \times 10.75' = 120.9$  sq. ft.

2.  $250' \times 175' = 43,750$  sq. ft.

1 square yard =  $3' \times 3' = 9$  sq. ft. Therefore divide by 9 to find its area in square yards:

$43,750 \div 9 = 4,861$  sq. yds. The lot is just slightly larger than an acre. (1 acre = 43,560 sq. ft.)

3. Shaded area A:

$$A = \frac{1}{2} \times (b_1 + b_2) \times h$$

$$A = \frac{1}{2} \times (80' + 160') \times 75'$$

$$A = 120' \times 75' = 9,000 \text{ sq. ft.}$$

Shaded area B:

Subtract the area of a  $50' \times 75'$  triangle from area of rectangle:  $100' \times 100' = 10,000$  sq. ft.

Area of triangle:  $\frac{1}{2} \times 50' \times 75' = 1,875$  sq. ft.

Total area =  $10,000 \text{ sq. ft.} - 1,875 \text{ sq. ft.} = 8,125 \text{ sq. ft.}$

## CHAPTER 25

### REVIEW QUESTIONS

(ANSWERS ON PAGE 619)

#### Commission and Sale Price

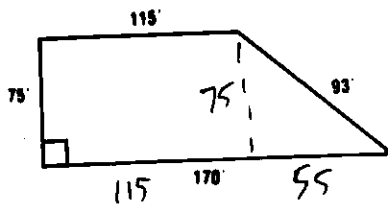
- A property sold for  $\frac{7}{8}$  of the \$60,000 asking price. If two brokers split the 6% commission, how much will each receive?
  - \$3,150
  - \$1,800
  - \$2,225
  - \$1,575
- Sales:            Commission Rate:  
 \$192,000            6%  
 \$255,600            3%  
 \$210,000            6%  
  
 A salesperson receives 25% of all commissions listed above. How much did he earn?
  - \$7,947
  - \$9,864
  - \$8,220
  - \$12,715.20
- A lot was purchased three years ago for \$70,000. It was listed for sale at a price which represented a 20% profit. If the seller accepted an offer which was \$6,000 below list price, what did she receive after paying a 6% commission?
  - \$73,320
  - \$78,960
  - \$72,960
  - \$73,800
- An apartment manager receives 30% of the first month's rent and 6% of each month thereafter. If the rent is \$640 per month, what will his annual fee amount to?
  - \$422.40
  - \$614.40
  - \$652.80
  - \$624.40
- A broker's commission earned on a sale was \$11,400. If he charged 6% of the first \$150,000 and 4% on any amount over that, what was the sale price?
  - \$228,600
  - \$165,000
  - \$175,500
  - \$210,000
- After paying the broker's commission fee of 7% and expenses of \$1,902, a seller desires a net amount to himself of \$204,000. What will the sale price be?
  - \$221,400
  - \$220,182
  - \$219,600
  - \$218,280
- Commissions are divided in a ratio of 3 to 2 by a broker and salesperson, respectively. On a sale of \$180,000 at a 7% commission, the salesperson is paid how much less than the broker?
  - \$1,800
  - \$2,520
  - \$5,040
  - \$2,850
- Clark Wink wants to realize \$185,000 from the sale of his property after paying expenses of \$4,000 and paying the broker a 10% commission. What must the sale price be?
  - \$207,500
  - \$207,900
  - \$209,500
  - \$210,000
- A salesperson is paid on a basis of 9% commission on the first \$80,000 of sales during one month plus 2.5% of any amount over \$80,000. If he sold four lots during one month for \$42,000, \$45,500, \$48,000 and \$49,500, how much more would he have made if he had been paid a straight 6% commission?
  - \$1,275
  - \$1,450
  - \$9,200
  - \$3,850
- A listing agreement provided for a commission to the broker of 6% of the first \$150,000 and 3% of anything above \$150,000. The commission received by the broker was \$10,350. What did the property sell for?
  - \$195,000
  - \$162,500
  - \$185,000
  - \$177,325

Appreciation/Depreciation

1. A house is currently valued at \$270,000. What was the value nine years ago, to the nearest \$100, if it has increased in value at an average rate of 6% per year?  
 (A) \$124,000  
 (B) \$174,500  
 (C) \$179,000  
 (D) \$175,325  
*54% current value*
2. A property which cost \$78,000 six years ago is now valued at \$66,300. What was the average yearly depreciation?  
 (A)  $6\frac{2}{3}\%$   
 (B)  $2\frac{1}{4}\%$   
 (C)  $2\frac{3}{8}\%$   
 (D)  $2\frac{1}{2}\%$
3. If you sell a lot for \$40,000 after making a 17% profit, what was the price you originally paid?  
 (A) \$32,999  
 (B) \$34,188  
 (C) \$37,650  
 (D) \$38,120
4. In eight years a property depreciated in value from \$120,000 to \$102,000. What was the average annual rate of depreciation?  
 (A) 2.16 %  
 (B) 1.875%  
 (C) 15%  
 (D) 1.765%

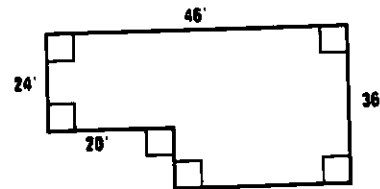
Measures (Area)

1. How many square feet are contained in the lot shown?

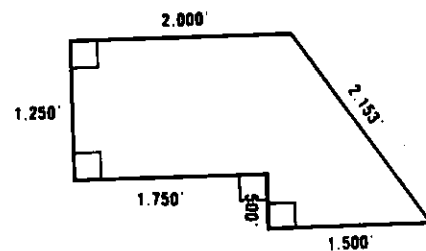


- (A) 21,375.0  
 (B) 10,687.5  
 (C) 11,970.0  
 (D) 12,970.5
2. An acre contains 43,560 sq. ft. A rectangular lot which measures 100' x 145.2' is what percent of an acre?  
 (A) 25%  
 (B) 33.3%  
 (C) 80%  
 (D) 20%

3. Office space measuring 102' x 84' rents for \$4.75 per square foot annually. What is the monthly rent payment?  
 (A) \$406.98  
 (B) \$3,391.50  
 (C) \$339.15  
 (D) \$4,069.80
4. The exterior of a ranch house measures 32 feet across the front and 26 feet front to back. If the exterior walls are 9 inches thick, what is the square footage of the interior?  
 (A) 803.25  
 (B) 793.00  
 (C) 832.00  
 (D) 747.25
5. The original cost to build the home shown below was \$155 per square foot. The cost to reproduce the same house today would be \$290,280. What has been the increase in cost per square foot?

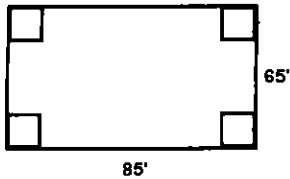


- (A) \$50.00  
 (B) \$43.29  
 (C) \$53.45  
 (D) \$37.50
6. If 30% of the tract shown is to be used for the construction of homes, how many acres will still be available for other purposes?



- (A) 43.67  
 (B) 59.76  
 (C) 61.35  
 (D) 72.50

7. How much would it cost to enclose the property described below with a privacy fence at a cost of \$4.38 per linear foot?



- (A) \$1,314  
 (B) \$1,530  
 (C) \$1,875  
 (D) \$1,950

### Interest

- Ken Fixit borrowed \$8,400 at  $8\frac{3}{4}\%$  interest. He repaid the principal and interest in one payment at the end of nine months. What amount did he pay?  
 (A) \$9,135.00  
 (B) \$8,951.25  
 (C) \$9,282.00  
 (D) \$9,851.25
- What is the annual interest rate on a \$9,200 loan if interest payments of \$212.75 are paid every three months?  
 (A) 7.82%  
 (B) 6.93%  
 (C) 10.81%  
 (D) 9.25%
- Semi-annual interest payments of \$3,200 are paid on an \$80,000 loan. What is the interest rate per annum?  
 (A) 8%  
 (B) 2%  
 (C) 24%  
 (D) 5%
- A lender charged 3 discount points on a \$147,000 loan. What was the dollar amount of discount points on this loan?  
 (A) \$441  
 (B) \$490  
 (C) \$4,410  
 (D) \$4,900
- Brown has a home improvement loan of \$7,500 on which he makes quarterly interest payments of \$168.75. What annual rate of interest does he pay?  
 (A) 9%  
 (B) 7.5%  
 (C) 4%  
 (D) 11%

- A borrower pays \$3,000 per month to pay back a fully amortized 30-year \$300,000 mortgage loan. When the loan is satisfied, how much interest will the borrower have paid?  
 (A) \$780,000  
 (B) \$78,000  
 (C) \$87,000  
 (D) \$807,000

### Proration

Note:

- For testing purposes use a 30-day month (360-day year) for proration problems.
- Unless told otherwise, the seller is responsible for the day of closing.

- A property was sold and the closing took place on April 15th. The annual taxes of \$8,100 were unpaid. What was the tax proration at closing?  
 (A) \$2,362.50 debit seller; credit buyer  
 (B) \$2,362.50 credit seller, debit buyer  
 (C) \$5,738.50 debit seller; credit buyer  
 (D) \$5,738.50 credit seller; debit buyer
- The annual taxes of \$3,960 and a three-year homeowner's policy costing \$1,188 were paid on January 1. If the property is sold on July 15, what amount will be credited to the seller?  
 (A) \$3,225.00  
 (B) \$2,250.00  
 (C) \$3,130.30  
 (D) \$2,788.50
- Martin is selling a 20-unit apartment building to Larsen Associates. Ten of the units rent for \$800 each per month, five of the units rent for \$1,000 each per month, three of the units rent for \$1,200 each per month, and the rest each rent for \$1,400 per month. Rents were paid on the first of the month for all units. If closing takes place on May 17, what rental adjustment will be received by the buyer?  
 (A) \$8,407  
 (B) \$9,356  
 (C) \$10,005  
 (D) \$12,225



4. A property is assessed at 40% of its appraised value of \$135,000. The tax rate is \$7.40 per \$100 and taxes are due and payable January 1st each year in advance. If the closing takes place on August 12th, how much will the buyer owe the seller for the prorated taxes?  
 (A) \$1,351.80  
 (B) \$1,531.80  
 (C) \$1,746.50  
 (D) \$1,831.80
5. A buyer bought a house and obtained a \$100,000 loan at 8% interest. The buyer is responsible for the closing date, which will be May 18. The buyer's first mortgage payment will be June 1. How much prepaid interest will be charged to the buyer at the closing?  
 (A) \$266.64  
 (B) \$288.86  
 (C) \$822.14  
 (D) \$955.46
5. Barry purchased a warehouse for \$230,000. The property rented out for \$3,200 per month with a 5% vacancy rate. Annual expenses were \$4,000 for utilities; \$5,200 for realty taxes; \$1,500 management fee; and \$9,700 for the mortgage interest payments. What would be the annual rate of return for this property?  
 (A) 6.9%  
 (B) 11%  
 (C) 14.3%  
 (D) 15.7%
6. The cost of building a rectangular dwelling 48 feet by 24 feet is \$142.50 per square foot. What will the price be to the nearest \$100 if the builder wants a gross profit of 14% on his investment?  
 (A) \$176,500  
 (B) \$179,225  
 (C) \$187,142  
 (D) \$193,250

### Investment & Appraising

1. A lot 160' x 410' sells for \$82,000. What should a second lot in the same area 204' x 375' sell for?  
 (A) \$107,300  
 (B) \$96,200  
 (C) \$95,625  
 (D) \$99,875
2. An investor realizes a 12% return on his investment. If the income is \$960 a month, what is the value of his property?  
 (A) \$8,000  
 (B) \$96,000  
 (C) \$80,000  
 (D) \$13,824
3. In order to realize a net profit of \$750 per month, how much must be invested at a 12% rate of return per annum?  
 (A) \$6,250  
 (B) \$75,000  
 (C) \$108,000  
 (D) \$10,800
4. A property has a current land value of \$60,000. Current replacement cost of improvements is \$230,000. Depreciation is 25%. What is the depreciated value for this property?  
 (A) \$212,500  
 (B) \$232,500  
 (C) \$223,500  
 (D) \$253,200
7. A percentage lease calls for a rent equal to 2 1/2% of the gross annual sales, with a minimum annual rent of \$6,000. What is the annual rent if gross sales were \$190,000?  
 (A) \$6,000  
 (B) \$4,750  
 (C) \$7,600  
 (D) \$10,750
8. Charlotte owns an investment that nets her \$900 per month. She realizes a 10% return on her investment each year. How much did she invest?  
 (A) \$90,000  
 (B) \$97,000  
 (C) \$103,750  
 (D) \$108,000
9. Each unit of an 18-family apartment dwelling rents for \$230 per month. Annual expenses are \$4,600 for maintenance, \$1,050 for insurance, \$5,134 for taxes, \$2,400 for heat and utilities, \$19,400 interest and 5% of the effective gross income for management fees. The vacancy rate is 5%. What is the owner's net rate of return the first year if he paid \$211,000 for the property?  
 (A) 12%  
 (B) 15%  
 (C) 6%  
 (D) 49%

10. An apartment dwelling has a monthly gross rental income of \$8,000 and the annual expenses are \$6,600. If a purchaser desires an 11% return on his investment, what must the purchase price be?  
 (A) \$872,727.27  
 (B) \$812,727.27  
 (C) \$983,400.00  
 (D) \$1,056,000.00
11. Smith purchased five parcels of land for \$7,000 each and sold them as eight separate parcels for \$5,600 each. What percent of profit did he make on his investment?  
 (A) 28%  
 (B) 35.7%  
 (C) 12.8%  
 (D) 21.9%
12. A factory building eight years old has a depreciated value of \$460,000. If the total economic life of the building is 40 years, what was its value new?  
 (A) \$532,000  
 (B) \$483,000  
 (C) \$575,000  
 (D) \$552,000
13. An apartment building has a vacancy factor of 4% and the annual expenses amount to \$2,352. What is the market value if the gross income is \$16,200 per year and the capitalization rate is 12%?  
 (A) \$194,400  
 (B) \$135,000  
 (C) \$153,400  
 (D) \$110,000
14. If you purchased a property for \$80,000 and sold it later for \$100,000, your rate of appreciation would be:  
 (A) 25%  
 (B) 18%  
 (C) 16%  
 (D) 20%
15. An investor purchased seven lots costing \$40,000 each and spent \$16,000 per lot for improvements. He wishes to sell the property for 15% more than he has invested. What must the sale price be?  
 (A) \$421,975  
 (B) \$478,400  
 (C) \$450,800  
 (D) \$482,500
16. A condominium complex containing 50 units was built on property costing \$58,000. \$48,000 was spent on roads, sidewalks and sewers. Construction costs amounted to \$1,245,000 and \$72,000 was spent on other expenses. All of the money was borrowed for eight months at an annual interest rate of 12%. If the developer wants a 15% net return on his total investment, what must each unit, to the nearest \$100, sell for?  
 (A) \$30,700  
 (B) \$35,300  
 (C) \$28,500  
 (D) \$33,000
17. A property is purchased for \$130,500. What must the minimum sale price be if annual expenses amounted to \$12,000 and a gross profit of 12% on the investment is to be realized on a resale at the end of one year?  
 (A) \$146,160  
 (B) \$159,600  
 (C) \$161,931  
 (D) \$156,900
18. If a building contains 48 offices, each having an area of 900 sq. ft., what is the vacancy rate if 10 of the offices are vacant for one month, one is empty for two months, and one is empty for five months?  
 (A) 2.95%  
 (B) 35.4%  
 (C) 14.7%  
 (D) 16.3%
19. Total rent during the year amounted to \$6,600 under a percentage lease calling for a base rent of \$500 a month plus 3 3/4% of the annual gross in excess of \$50,000. What amount did the business gross?  
 (A) \$52,250  
 (B) \$66,000  
 (C) \$72,250  
 (D) \$64,500

### Taxes & Insurance

1. A building lot is valued at \$40,000 and is assessed at 75%. If the tax bill is \$1,200, what is the tax rate per \$100?  
 (A) \$4.00  
 (B) \$400  
 (C) \$.25  
 (D) \$3.00

2. A 150' x 250' commercial lot was assessed at \$140 per front foot and the building was assessed at \$85,000. What was the yearly tax if the rate was \$8.60 per \$100?
  - (A) \$7,562
  - (B) \$7,265
  - (C) \$9,116
  - (D) \$10,320
3. A township assesses property at 80% of value. Semi-annual taxes of \$902.40 are paid by the owner of a house valued at \$48,000. What is the tax rate per \$100?
  - (A) \$4.70
  - (B) \$2.35
  - (C) \$3.76
  - (D) \$1.88
4. If the contents of a home were valued at \$12,000 and insured for \$8,400, contents valued at \$18,500 would be insured for:
  - (A) \$12,950
  - (B) \$12,250
  - (C) \$11,600
  - (D) \$12,400
5. In a town that has a tax rate of \$5.70 per \$100, a house with an annual tax bill of \$5,985 is placed on the market for \$180,000. What is the assessed value?
  - (A) \$105,000
  - (B) \$115,000
  - (C) \$130,000
  - (D) \$1,598
6. In question #5, the assessed value is what percent of the market value?
  - (A) 17.14%
  - (B) 58.3%
  - (C) 171.4%
  - (D) 63.4%
7. If the assessed value of a property is 80% of its market value, what are the annual taxes if the tax rate is \$3.75 per \$100 and the market value is \$56,000?
  - (A) \$1,194.67
  - (B) \$1,680.00
  - (C) \$2,100.00
  - (D) \$1,870.50

### Miscellaneous

1. A developer has determined that  $\frac{1}{2}$  of his tract will be used for the construction of single-family homes,  $\frac{1}{3}$  will be allocated for a shopping center, and 72 acres will be reserved for recreation areas. How many acres will be used for the shopping center?
  - (A) 144
  - (B) 432
  - (C) 216
  - (D) 72
2. Great Deal Realty deducts 8% of the total commission for promotional and advertising expenses and pays its listing and selling agents each 25% of the balance. What would one of its associates earn if she listed and sold a house for \$160,000, with a 5.5% commission?
  - (A) \$1,673
  - (B) \$8,096
  - (C) \$4,048
  - (D) \$8,800
3. A tract of land measures 2,000' x 150'. A lot within the tract is 75' x 100'. The lot is what fraction of the entire tract?
  - (A)  $\frac{1}{25}$
  - (B)  $\frac{1}{40}$
  - (C)  $\frac{1}{30}$
  - (D)  $\frac{1}{50}$
4. Sue B. Lett and her husband bought a two-family home and want enough rent from one apartment that they can live in the other rent-free. Their annual expenses are \$5,040 and taxes are \$3,264. Their monthly loan payments are \$720. What must the monthly rent be?
  - (A) \$1,532
  - (B) \$1,152
  - (C) \$752
  - (D) \$1,412
5. A house and lot are purchased for \$70,000. The cost of the lot amounted to 25% of the purchase price. If the bank will loan 90% of the value of the house, how much will the down payment be?
  - (A) \$11,667
  - (B) \$7,000
  - (C) \$17,500
  - (D) \$22,750

- 6. The monthly payment on a \$37,000 mortgage is \$8.50 per \$1,000. The annual taxes of \$1,008 and a three-year insurance policy costing \$432 are prorated and paid monthly. What is the total monthly payment?  
 (A) \$354.50  
 (B) \$434.50  
 (C) \$410.50  
 (D) \$420.50
- 7. The purchase price of a home is \$177,000. The down payment is 3% of the first \$100,000 and 5% of the balance. How much will the seller pay if he is to be charged 2 discount points?  
 (A) \$4,228  
 (B) \$5,150  
 (C) \$3,403  
 (D) \$4,400
- 8. Which of the transactions listed below will provide the seller with a net amount of \$40,910?

Transaction	Sale Price	Broker's Fee	Additional Expenses
I	\$43,700	6%	\$126
II	\$43,900	6%	\$356
III	\$43,500	6%	\$ 40
IV	\$43,900	6%	\$340

- (A) I    (B) II    (C) III    (D) IV

- 9. A tract of land was subdivided, allowing 50% of the total area for residential use, 1/4 of the land for a shopping center, 1/8 for streets, and five acres for recreation. What is the total acreage?  
 (A) 40 acres  
 (B) 62.5 acres  
 (C) 52 acres  
 (D) 46 acres
- 10. A lease provides for a base rent of \$750 per month plus 2.5% of all gross annual income in excess of \$240,000. The lessee realized a gross annual income of \$310,000. How much rent did he pay that year?  
 (A) \$15,000  
 (B) \$10,750  
 (C) \$13,750  
 (D) \$9,175
- 11. Nellie borrowed \$4,500 at 9.75% interest per year. When she prepaid the loan, she paid \$156.39 in interest. How long did she have the money?  
 (A) 93 days  
 (B) 95 days  
 (C) 116 days  
 (D) 128 days

- 12. The sellers have agreed to a sale price of \$262,500 for their property. In addition to the 6% broker's fee, they have also consented to pay a 5-point discount fee in order that the purchasers may obtain an FHA-insured loan of \$250,000. How much will the sellers net from the sale?  
 (A) \$227,625  
 (B) \$246,830  
 (C) \$234,250  
 (D) \$247,956
- 13. Smith has purchased Jones' home for \$50,000 and is assuming Jones' mortgage balance of \$40,000 at 9% interest rate. The closing takes place August 20th and Jones has not made his August payment. What will the entry be on the seller's closing statement?  
 (A) \$200 debit  
 (B) \$200 credit  
 (C) \$100 credit  
 (D) \$100 debit
- 14. An investor purchased two properties, paying \$120,000 for the first one. The first property cost 80% of what he paid for the second one. What was the purchase price of the second property?  
 (A) \$150,000  
 (B) \$96,000  
 (C) \$144,000  
 (D) \$154,000
- 15. A real estate salesperson receives 40% of the 6% fees paid to her broker on her sales. What are her average monthly sales if she earns \$18,000 annually?  
 (A) \$43,200  
 (B) \$62,500  
 (C) \$52,500  
 (D) \$75,000
- 16. Smith pays \$8.05 per \$1,000 per month on his mortgage loan. He borrowed 80% of the \$180,000 purchase price at 9% interest for 30 years. How much does Smith pay monthly?  
 (A) \$1,357.00  
 (B) \$1,260.20  
 (C) \$1,159.20  
 (D) \$1,205.00
- 17. A \$168,000 mortgage loan is to be amortized at \$8.05 per \$1,000 per month. The quarterly taxes of \$2,496 and a three-year insurance premium of \$3,168 are to be prorated and paid monthly. What is the total monthly payment?  
 (A) \$1,692.40  
 (B) \$2,272.40  
 (C) \$1,604.40  
 (D) \$1,812.40



18. Sarah sold a lot for 25% more than she paid for it. She invested the proceeds at 12%, which gave her \$970 per year in interest. What did she originally pay for the lot?
- (A) \$2,943  
 (B) \$11,547  
 (C) \$6,467  
 (D) \$5,658

19. On a scale drawing on which 1" = 4', a room shown as 7.5" x 3.75" would contain how many square feet?
- (A) 351.5  
 (B) 112.5  
 (C) 1,125  
 (D) 450

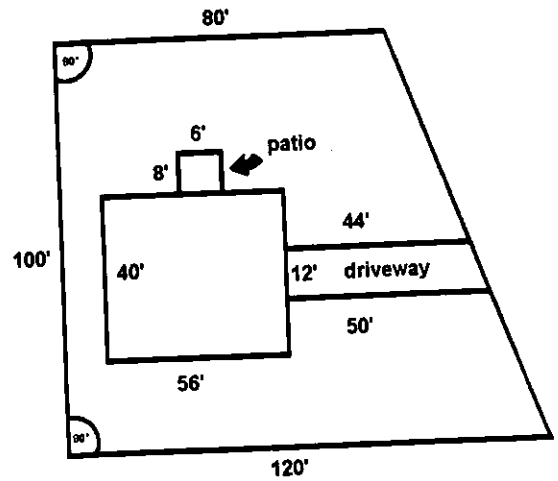
20. Bill Buttons sold his home for \$127,500 after making a profit of 35% on his purchase price. How much did he originally pay for the home?
- (A) \$82,875  
 (B) \$86,750  
 (C) \$172,125  
 (D) \$94,444

21. A rectangular tract of land containing two acres has a frontage of 528 feet. What is the depth of the property?
- (A) 165'  
 (B) 82.5'  
 (C) 121'  
 (D) 460'

22. A rectangular lot is 125' x 95'. The town has a required setback of 15 ft., sideyard restrictions of 8 ft. and a rear line of 6 ft. This is not a corner lot. If you are allowed to build on 75% of the unrestricted area, what is the area of the largest one-story house you could build on this lot?
- (A) 6,049 sq. ft.  
 (B) 4,069 sq. ft.  
 (C) 8,066 sq. ft.  
 (D) 10,082 sq. ft.

23. If the tax assessment on a piece of property increased by 30% and the tax rate decreased by 30%, what happens to the taxes?
- (A) 30% increase  
 (B) 30% decrease  
 (C) Stay the same  
 (D) Decrease by 9%

24. The property below was bought at a cost of \$210,000. Mrs. Jones, the owner, is going to convert the one-family house into offices and to landscape the grounds. If it cost her \$0.40 per square foot for landscaping, what must she charge per square foot of office space so that her gross return is 16% of her investment?



Round answer to the nearest dollar

- (A) \$31.00  
 (B) \$15.00  
 (C) \$28.00  
 (D) \$37.00
25. Mr. Jones wants to sell his home at a 25% profit. If the selling price ends up being 20% less than the asking price, what is the net result?
- (A) 5% gain  
 (B) 5% loss  
 (C) 45% gain  
 (D) Selling price = Original purchase price
26. A seller paid \$4,235, which represented a 7 discount points fee on an FHA mortgage. What was the amount of the loan?
- (A) \$60,500  
 (B) \$30,750  
 (C) \$2,965  
 (D) \$80,050
27. A homeowner's home appreciated 10% over the past 10 years. If he sells his home at this new price and pays a broker a commission of 10% of the selling price, which of the following is true?
- (A) 10% gain  
 (B) 10% loss  
 (C) Net selling price = Original cost  
 (D) Net selling price is 1% less than original cost.

3. **B** Title insurance policies usually do not cover defects in boundaries and survey, or encroachments.
4. **B** Monuments are used by surveyors to determine land locations but do not establish elevations.
5. **C** Metes refers to measures; bounds to boundaries.
6. **D** Also street address and lot and block number on a recorded map.
7. **D** Surveyors use benchmarks to measure elevations.
8. **D** Monuments may be natural such as a tree or the edge of water, or man-made such as a cement-filled pipe, or a brass plaque in a sidewalk to serve as a benchmark.
9. **D** The starting point is called the point of beginning. The description must begin and end at the same identical point.
10. **C** Usually included as part of a title search.
11. **C** This method of land description is not used in N.J.
12. **D** A quadrangle is a 24-square-mile area used in connection with the Government Survey System.
13. **A** A square  $1/2$  mile is  $1/4$  of a square mile.  $640 \div 4 = 160$ .
14. **D** A metes and bounds description starts at a well-marked point of beginning and proceeds in distances and directions until it returns to the same beginning point.

### Chapter 24 Planning, Zoning and Building Ordinances

1. **A** Title closing is the process of transferring title, not a restriction.
2. **B** Base lines are used with Government Survey; deed restrictions are private limitations.
3. **A** Real estate boards have no control over land uses.
4. **B** Exclusion of low-income families through zoning would be unlawful.
5. **A** A buffer zone is a transitional area separating a residential area from a less desirable contiguous use such as commercial or industrial.
6. **A** To provide for safe and sound construction.
7. **B** The use is "grandfathered."
8. **B** Setback provisions are intended to keep buildings away from streets to provide more light and air and less noise for homeowners.
9. **A** All except escheat can be exercised by municipal, county, state or federal governments.
10. **D** The use can continue.
11. **D** All are planning board functions.

12. **A** Application is made to Zoning Board or Planning Board, depending on type.
13. **B** Required by state law.

### Chapter 25 Real Estate Mathematics Commission and Sale Price

1. **D**  $7/8 = 7 \div 8 = .875 = 87.5\%$   
 $\$60,000 \times 87.5\% = \$52,500$  sale price  
 $\$52,500 \times 6\% = \$3,150$  total commission  
 $\$3,150 \div 2 = \$1,575$  for each broker
2. **A**  $\$192,600 \times 6\% = \$11,520$ ;  
 $\$255,600 \times 3\% = \$7,668$ ;  
 $\$210,000 \times 6\% = \$12,600$ .  
 $\$11,520 + \$7,668 + \$12,600 = \$31,788$   
total commissions  
 $\$31,788 \times 25\% = \$7,947$  salesperson's earnings
3. **A**  $100\% + 20\% = 120\%$   
 $\$70,000 \times 120\% = \$84,000$  list price  
 $\$84,000 - \$6,000 = \$78,000$  selling price  
 $\$78,000 \times 6\% = \$4,680$  commission  
 $\$78,000 - \$4,680 = \$73,320$  net to seller
4. **B**  $\$640 \times 30\% = \$192$  first month  
 $\$640 \times 6\% = \$38.40$  each month thereafter  
 $\$38.40 \times 11$  months = \$422.40  
 $\$192 + \$422.40 = \$614.40$  annual fee
5. **D**  $\$150,000 \times 6\% = \$9,000$  commission on first \$150,000  
 $\$11,400 - \$9,000 = \$2,400$  commission at 4%  
 $\$2,400 \div 4\% = \$60,000$  amount over \$150,000  
 $\$150,000 + \$60,000 = \$210,000$  sale price
6. **A**  $\$204,000 + \$1,902 = \$205,902$   
 $100\% - 7\% = 93\%$   
 $\$205,902 \div 93\% = \$221,400$
7. **B**  $\$180,000 \times 7\% = \$12,600$   
 $3 + 2 = 5$  parts  
 $\$12,600 \div 5$  parts = \$2,520 per part  
 $\$2,520 \times 3 = \$7,560$  broker's share  
 $\$2,520 \times 2 = \$5,040$  salesperson's share  
 $\$7,560 - \$5,040 = \$2,520$  less to salesperson
8. **D** Must get  $\$185,000 + \$4,000 + 10\%$  commission  
 $\$189,000 = 90\%$  of sale price  
 $\$189,000 \div 90\% = \$210,000$  sale price

9. **A**  $\$42,000 + \$45,500 + \$48,000 + \$49,500 =$   
 $\$185,000$  total sales  
 $\$80,000 \times 9\% = \$7,200$  commission on  
 first  $\$80,000$   
 $\$105,000 \times 25\% = \$2,625$  commission on  
 amount in excess of  $\$80,000$   
 $\$7,200 + \$2,625 = \$9,825$  total commis-  
 sion  
 $\$185,000 \times 6\% = \$11,100$  commission at  
 6%  
 $\$11,100 - \$9,825 = \$1,275$  more at 6%
10. **A**  $\$150,000 \times 6\% = \$9,000$  commission on  
 first  $\$150,000$   
 $\$10,350 - \$9,000 = \$1,350$  commission on  
 amount over  $\$150,000$   
 $\$1,350 \div 3\% = \$45,000$  sale price over  
 $\$150,000$   
 $\$150,000 + \$45,000 = \$195,000$  sale price

### Appreciation/Depreciation

1. **D**  $9 \text{ years} \times 6\% = 54\%$  increase in value  
 $100\% \text{ original value} + 54\% = 154\%$  current  
 value  
 $\$270,000 \div 154\% = \$175,325$  original  
 value (rounded)
2. **D**  $\$78,000 - \$66,300 = \$11,700$  depreciation  
 over 6 years  
 $\$11,700 \div \$78,000 = 15\%$  depreciation  
 over 6 years  
 $15\% \div 6 = 2.5\%$  average depreciation per  
 year
3. **B**  $\$40,000 \div 117\% = \$34,188$
4. **B**  $\$120,000 - \$102,000 = \$18,000$  amount of  
 depreciation  
 $\$18,000 \div \$120,000 = 15\%$  depreciation in  
 8 years  
 $15\% \div 8 = 1.875\%$  annually

### Measures (Area)

1. **B** Area of a trapezoid =  $1/2$  (base + base) x  
 height  
 Area =  $1/2$  ( $115' + 170'$ ) x  $75' = 10,687.5$   
 sq. ft.
2. **B**  $100' \times 145.2' = 14,520$  sq. ft.  
 $14,520 \div 43,560$  sq. ft. =  $.333 = 33.3\%$
3. **B**  $102' \times 84' = 8,568$  sq. ft.  
 $8,568$  sq. ft. x  $\$4.75 = \$40,698$  annual rent  
 $\$40,698 \div 12$  months =  $\$3,391.50$  per  
 month
4. **D** 9 inches thickness on each side =  
 18 inches or 1.5 ft.

$$32' - 1.5' = 30.5'$$

$$26' - 1.5' = 24.5'$$

$$30.5' \times 24.5' = 747.25 \text{ sq. ft.}$$

5. **A**  $24' \times 46' = 1,104$  sq. ft.  
 $12' \times 26' = 312$  sq. ft.  
 $1,104 + 312 = 1,416$  sq. ft. total area  
 $\$290,280$  present cost  $\div$   $1,416$  sq. ft. =  
 $\$205$  per sq. ft.  
 $\$205$  per sq. ft. present cost -  $\$155$  per  
 sq. ft. original cost =  $\$50$  per sq. ft.  
 increase
6. **B**  $A = 1,750' \times 1,250' = 2,187,500$  sq. ft.  
 $B = (2,000' - 1,750') \times (1,250' + 500') =$   
 $250' \times 1,750' = 437,500$  sq. ft.  
 $C = 1/2 (1,500' - 250') \times (1,250' + 500') =$   
 $1/2 (1,250') \times 1,750' = 625' \times 1,750 =$   
 $1,093,750$  sq. ft.  
 $2,187,500$  sq. ft. +  $437,500$  +  $1,093,750 =$   
 $3,718,750$  sq. ft.  
 $3,718,750 \times 70\%$  (for use other than  
 homes) =  $2,603,125$  sq. ft.  
 $2,603,125$  sq. ft.  $\div$   $43,560$  (sq. ft. per acre)  
 =  $59.76$  acres
7. **A**  $65' + 85' + 65' + 85' = 300$  linear feet  
 $300 \text{ ft.} \times \$4.38 = \$1,314$

### Interest

1. **B**  $\$8,400 \times 8.75\% = \$735$  annual interest  
 $\$735 \div 12 = \$61.25$  interest per month  
 $\$61.25 \times 9 = \$551.25$  interest for nine  
 months  
 $\$8,400 + \$551.25 = \$8,951.25$
2. **D**  $\$212.75 \times 4 = \$851$  annual interest  
 $\$851 \div \$9,200 = 9.25\%$  annual interest  
 rate
3. **A**  $\$160 \times 4 = \$640$  annual interest  
 $\$640 \div \$8,000 = 8\%$  annual interest rate
4. **C**  $\$147,000 \times 3\% = \$4,410$
5. **A**  $\$156.25 \times 4 = \$675$  annual interest  
 amount  
 $\$675 \div \$7,500 = 9\%$  annual interest rate
6. **A**  $360 \times \$3,000 = \$1,080,000 - \$300,000 =$   
 $\$780,000$

### Proration

1. **A**  $\$8,100 \div 360 = \$22.50$  cost/day  
 $\$22.50 \times 105 = \$2,362.50$ , debit seller,  
 credit buyer

2. **D**  $\$3,960 \div 12 \text{ months} = \$330 \text{ taxes per month}$   
 $12 \text{ months} - 6.5 \text{ months} = 5.5 \text{ months tax credit to seller}$   
 $5.5 \text{ months} \times \$330 = \$1,815 \text{ tax credit to seller}$   
 $\$1,188 \div 36 \text{ months} = \$33 \text{ insurance/month}$   
 $36 \text{ months} - 6.5 \text{ months} = 29.5 \text{ months insurance credit to seller}$   
 $29.5 \times \$33 = \$973.50 \text{ credit to seller}$   
 $\$1,815 + \$973.50 = \$2,788.50 \text{ total credit to seller}$
3. **A**  $10 \times \$800 = \$8,000$   
 $5 \times \$1,000 = \$5,000$   
 $3 \times \$1,200 = \$3,600$   
 $2 \times \$1,400 = \$2,800$   
 $\$8,000 + \$5,000 + \$3,600 + \$2,800 = \$19,400/\text{month}$   
 $\$19,400 \div 360 = \$53.61 \text{ per day}$   
 $30 \text{ days} - 17 \text{ days} = 13 \text{ days}$   
 $\$53.61 \times 13 \text{ days} = \$696.93$
4. **B**  $\$135,000 \times 40\% = \$54,000 \text{ assessed value}$   
 $\$7.40 \text{ per } \$100 = 7.4\%$   
 $\$54,000 \times 7.4\% = \$3,996 \text{ annual taxes}$   
 $\$3,996 \div 360 = \$11.10 \text{ daily taxes}$   
 $\$11.10 \times 138 \text{ days (4 months, 18 days)} = \$1,531.80$
5. **B**  $\$100,000 \times 8\% = \$8,000 \text{ annual interest}$   
 $\$8,000 \div 360 = \$22.22 \text{ interest per day}$   
 $\$22.22 \times 13 = \$288.86$
6. **C**  $48' \times 24' = 1,152 \text{ sq. ft.}$   
 $1,152 \times \$142.50 \text{ per sq. ft.} = \$164,160 \text{ total cost}$   
 $\$164,160 \times 114\% = \$187,142$
7. **A**  $\$190,000 \times 2.5\% = \$4,750$   
 $\$6,000 \text{ minimum rent must be paid.}$
8. **D**  $\$900 \times 12 \text{ months} = \$10,800 \text{ annual net income}$   
 $\$10,800 \div 10\% = \$108,000 \text{ investment}$
9. **B**  $\$230 \times 18 = \$4,140 \text{ per month gross rent}$   
 $\$4,140 \times 12 = \$49,680 \text{ annual gross income fully rented}$   
 $\$49,680 \times 5\% \text{ vacancy rate} = \$2,484$   
 $\$49,680 - \$2,484 = \$47,196 \text{ effective gross income}$   
 $\$47,196 \times 5\% \text{ management fee} = \$2,360$   
 $\$4,600 + \$1,050 + \$5,134 + \$2,400 + \$2,360 = \$15,544 \text{ annual expenses}$   
 $\$47,196 - \$15,544 = \$31,652 \text{ net operating income (NOI)}$   
 $\$31,652 \div \$211,000 = .15 = 15\%$
10. **B**  $\$8,000 \times 12 \text{ months} = \$96,000 \text{ annual income}$   
 $\$96,000 - \$6,600 \text{ annual expenses} = \$89,400 \text{ annual net income}$   
 $\$89,400 \div 11\% \text{ rate of return} = \$812,727.27 \text{ sale price}$
11. **A**  $\$7,000 \times 5 = \$35,000 \text{ investment}$   
 $\$5,600 \times 8 = \$44,800 \text{ sale price}$   
 $\$44,800 - \$35,000 = \$9,800 \text{ profit}$   
 $\$9,800 \div \$35,000 = .28 = 28\% \text{ profit}$
12. **C**  $100\% \div 40 \text{ years} = .025 = 2.5\% \text{ per year}$   
 $2.5\% \times 8 \text{ years} = 20\% \text{ depreciation to date}$   
 $100\% - 20\% = 80\% \text{ of remaining value}$   
 $\$460,000 \div 80\% = \$575,000 \text{ value new}$
13. **D**  $\$16,200 \times 4\% = \$648 \text{ vacancy factor}$   
 $\$16,200 - \$648 = \$15,552 \text{ effective gross income}$   
 $\$15,552 - \$2,352 = \$13,200 \text{ net income}$   
 $\$13,200 \div 12\% = \$110,000 \text{ market value}$
14. **A**  $\$20,000 \div \$80,000 = 25\%$
15. **C**  $\$40,000 \times 7 = \$280,000 \text{ purchase price}$   
 $\$16,000 \times 7 = \$112,000 \text{ cost of improvements}$   
 $\$280,000 + \$112,000 = \$392,000 \text{ total investment}$   
 $\$392,000 \times 115\% = \$450,800 \text{ sale price}$
16. **B**  $\$58,000 + \$48,000 + \$1,245,000 + \$72,000 = \$1,423,000$   
 $12\% \text{ annual interest rate} \div 12 = 1\% \text{ per}$

### Investment & Appraising

1. **C**  $160' \times 410' = 65,600 \text{ sq. ft.}$   
 $\$82,000 \div 65,600 = \$1.25 \text{ per sq. ft.}$   
 $204' \times 375' = 76,500 \text{ sq. ft.}$   
 $76,500 \times \$1.25 = \$95,625 \text{ sale price}$
2. **B**  $\$960 \times 12 \text{ months} = \$11,520 \text{ annual income}$   
 $\$11,520 \div 12\% = \$96,000 \text{ value of property}$
3. **B**  $\$750 \times 12 \text{ months} = \$9,000 \text{ net profit/year}$   
 $\$9,000 \div 12\% = \$75,000 \text{ required investment}$
4. **B**  $\$230,000 \times 25\% = \$57,500 \text{ depreciation}$   
 $\$230,000 - \$57,500 + \$60,000 \text{ (land)} = \$232,500 \text{ depreciated value}$
5. **B**  $\$3,200 \times 12 = \$38,400 \text{ gross annual income}$   
 $\$38,400 - \$1,920 \text{ (vacancy)} - \$4,000 \text{ (utilities)} - \$5,200 \text{ (taxes)} - \$1,500 \text{ (management fee)} = \$25,780 \text{ net operating income (NOI)}$



month

8 months  $\times$  1% = 8% interest paid on loan  
 $\$1,423,000 \times 8\% = \$113,840$  interest for 8 months  
 $\$1,423,000 + \$113,840 = \$1,536,840$  total investment  
 $\$1,536,840 \times 15\%$  profit = \$230,526 profit  
 $\$1,536,840 + 230,526 = \$1,767,366$   
 $\$1,767,366 \div 50$  units = \$35,347.32 per unit  
 $\$35,347.32$  to nearest \$100 = \$35,300 per unit

17. **B**  $\$130,500$  purchase price + \$12,000 expenses = \$142,500 total investment  
 $\$142,500 \times 112\% = \$159,600$  sale price
18. **A** 48 offices  $\times$  12 months = 576 months  
 $10 + 2 + 5 = 17$  months vacant  
 $17 \div 576 = 2.95\%$
19. **B**  $\$500 \times 12$  months = \$6,000 annual base rent  
 $\$6,600 - \$6,000 = \$600$  rent in excess of base rent  
 $\$600 \div 3.75\% = \$16,000$  gross over \$50,000  
 $\$50,000 + \$16,000 = \$66,000$  total annual gross

**Taxes/Insurance**

1. **A**  $\$40,000 \times 75\% = \$30,000$   
 $\$1,200 \div \$30,000 = .04$   
 $\$100 \times 4\% = \$4.00$
2. **C**  $150' \times \$140$  per front foot = \$21,000 land assessment  
 $\$21,000 + \$85,000$  (building assessment) = \$106,000 assessed value  
 $\$106,000 \times 8.6\% = \$9,116$  annual taxes
3. **A**  $\$48,000 \times 80\% = \$38,400$  assessed value  
 $\$902.40 \times 2 = \$1,804.80$  annual taxes  
 $\$1,804.80 \div \$38,400 = \$0.047$  tax rate per dollar  
 $\$0.047$  per dollar = \$4.70 per \$100
4. **A**  $\$8,400 \div \$12,000 = .70$  or 70% of value  
 $\$18,500 \times 70\% = \$12,950$  insured value
5. **A**  $\$5,985 \div 5.7\% = \$105,000$ .
6. **B**  $\$105,000 \div \$180,000 = 58.3\%$
7. **B**  $\$56,800 \times 80\% = \$44,800$  assessed value  
 $\$3.75$  per \$100 = 3.75%  
 $\$44,800 \times 3.75\% = \$1,680$  annual taxes

**Miscellaneous**

1. **A** Single family homes =  $1/2$  or 50% of entire tract  
 Shopping center =  $1/3$  or 33.333% of entire tract  
 $100\%$  (entire tract - 83.333% = 16.666%)  
 Therefore 16.666% = 72 acres  
 $72 \div 16.666\% = 432$  acres entire tract  
 $432 \times 33.333\% = 144$  acres used for shopping center
2. **C**  $\$160,000 \times 5.5\% = \$8,800$   
 $\$8,800 \times 92\% = \$8,096$   
 $\$8,096 \div 2 = \$4,048$
3. **B**  $2,000' \times 150' = 300,000$  sq. ft.  
 $75' \times 100' = 7,500$  sq. ft.  
 $7,500 \div 300,000 = .025 = 2.5/100 = 1/40$  of entire tract
4. **D**  $\$5,040 \div 12 = \$420$  monthly expense  
 $\$3,264 \div 12 = \$272$  monthly taxes  
 $\$420 + \$272 + \$720$  (loan payments) = \$1,412 rent to cover total expenses
5. **D**  $\$70,000 \times 25\% = \$17,500$  value of lot  
 $\$70,000 - \$17,500 = \$52,500$  value of house  
 $\$52,500 \times 90\% = \$47,250$  bank loan  
 $\$70,000 - \$47,250 = \$22,750$  down payment
6. **C**  $\$37,000 \div 1,000 = 37$   
 $37 \times \$8.50 = \$314.50$  per month for mortgage  
 $\$1,008$  taxes  $\div 12 = \$84$  per month taxes  
 $\$432$  insurance  $\div 36 = \$12$  per month insurance  
 $\$314.50 + \$84 + \$12 = \$410.50$  total monthly payment
7. **C**  $\$177,000$  purchase price  
 $\$100,000 \times 3\% = \$3,000$   
 $\$77,000 \times 5\% = \$3,850$   
 $\$3,000 + \$3,850 = \$6,850$  down payment  
 $\$177,000 - \$6,850 = \$170,150$  amount financed  
 $\$170,150 \times 2\% = \$3,403$
8. **B**  $\$43,900 \times 6\% = \$2,634$  commission amount  
 $\$43,900 - \$2,634 = \$41,266$  sale price less commission  
 $\$41,266 - \$356 = \$40,910$  net to seller (Transaction II)
9. **A** 50% = residential use;  $1/4 = 25\%$  shopping center;  $1/8 = 12.5\%$  for streets  
 $50\% + 25\% + 12.5\% = 87.5\%$   
 $12.5\%$  remaining = 5 acres for recreation  
 $5$  acres  $\div 12.5\% = 40$  acres total

10. **B**  $\$750 \times 12 \text{ months} = \$9,000$  annual base rent  
 $\$310,000 - \$240,000 = \$70,000$  excess over minimum  
 $\$70,000 \times 2.5\% = \$1,750$  additional rent  
 $\$9,000 + \$1,750 = \$10,750$  annual rent
11. **D**  $\$4,500 \times 9.75\% = \$438.75$  annual interest  
 $\$438.75 \div 360 \text{ days} = \$1.22$  daily interest  
 $\$156 \div \$1.22 = 128$  days
12. **C**  $\$262,500 \times 6\% = \$15,750$  broker's fee  
 $\$250,000 \times 5\% = \$12,500$  loan discount (points)  
 $\$15,750 + \$12,500 = \$28,250$   
 $\$262,500 - \$28,250 = \$234,250$  net to sellers
13. **A**  $\$40,000 \times 9\% = \$3,600$  annual interest  
 $\$3,600 \div 360 \text{ days} = \$10$  per day  
 $\$10 \times 20 \text{ days} = \$200$  debit
14. **A**  $120,000 \div 80\% = \$150,000$
15. **B**  $40\% \text{ of } 6\% = 40\% \times 6\% = 2.4\%$   
 $\$18,000 \div 2.4\% = \$750,000$  per year  
 $\$750,000 \div 12 \text{ months} = \$62,500$  average monthly sales
16. **C**  $\$180,000 \times 80\% = \$144,000$  mortgage amount  
 $\$144,000 \div 1,000 = 144$   
 $\$8.05 \times 144 = \$1,159.20$  per month
17. **B**  $\$168,000 \div 1,000 = 168$   
 $\$8.05 \times 168 = \$1,352.40$  per month mortgage payment  
 $\$2,496 \div 3 = \$832$  tax per month  
 $\$3,168 \div 36 = \$88$  insurance per month  
 $\$1,352.40 + \$832 + \$88 = \$2,272.40$  monthly payment
18. **C**  $\$970 \div 12\% = \$8,083.33$   
 $\$8,083.33 \div 125\% = \$6,466.66$
19. **D**  $7.5'' \times 4 = 30'$   
 $3.75'' \times 4 = 15'$   
 $30' \times 15' = 450 \text{ sq. ft.}$
20. **D**  $\$127,500 \div 135\% = \$94,444$
21. **A** Area of rectangle = base  $\times$  height  
 $43,560 \text{ sq. ft.} \times 2 = 87,120 \text{ sq. ft.}$  in tract  
 $87,120 \text{ sq. ft.} \div 528' \text{ frontage} = 165' \text{ depth}$
22. **A**  $109' \times 74' = 8,066 \text{ sq. ft.}$   
 $8,066 \times 75\% = 6,049 \text{ sq. ft.}$
23. **D**  $70\% \times 130\% = 91\%$  ( $91\% = 9\%$  decrease)
24. **B** Lot = 10,000 sq. ft.  
 $(1/2(B + B) \times H = 100' \times 100')$

Office space = 2,240 sq. ft.  
 Driveway = 564 sq. ft.  
 Patio = 48 sq. ft.  
 Landscaped area = 7,148 sq. ft. ( $10,000 - 2,852$ )  
 $7,148 \text{ sq. ft.} \times .4 = \$2,859.20$  landscaping cost  
 $\$210,000 \text{ cost} + \$2,859.20 = \$212,859.20$   
 $\$212,859.20 \times 16\% = \$34,057.47$   
 $\$34,057.47 \div 2,240 = \$15.20$  charge per sq. ft. of office space

25. **D**  $125\% \times 80\% = 100\%$
26. **A**  $\$4,235 \div 7\% = \$60,500$
27. **D**  $110\% \times 90\% = 99\%$

## Chapter 26 Business Opportunities

- A** Also with the N.J. Secretary of State.
- D** Called a "covenant not to compete."
- B** A security agreement would be used to finance the inventory and any other personal property.
- D** A fee can be legally paid to, and received by, an unlicensed person for the sale of the business only.
- B** The "as is" clause gives only limited protection to the seller and is not a defense against fraudulent misrepresentation.
- D** The Uniform Commercial Code primarily covers personal property transactions.

## Chapter 27 Environmental Laws

- C** EPA is the federal agency; DEP is state.
- A** Only wells that supply drinking water.
- D** Any of these conditions present potential liability.
- A** Testing is not required by law.
- D** Current and former owners are liable.
- A** Formerly called ECRA.
- D** A, B and C are true statements.
- D** All of these statements are true.

## Glossary Review Questions

- B** For example, quoting an authority.
- A** For instance,  $\$100,000 \div 27.5 \text{ years}$  (economic life) = 3.64% straight line depreciation.
- C** Littoral property differs from riparian property which borders waterways such as lakes and streams.
- B** Also a promise or agreement.
- D** Pending final disposition of court