Introduction to the Approaches to Value

A Self-Study Course for Assessors & Appraisers

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Introduction

Lesson 1: How Value Affects Property Taxes

In Oregon, property taxes are the primary funding source for police, fire protection, education and other services provided by local taxing districts, such as cities, counties, and schools. Taxation limitation measures passed in the 1990s dramatically changed the way property taxes are calculated in Oregon.

History

Prior to taxation measures passed in the 1990s, county assessors estimated the real market values of all taxable property in the state. Generally speaking, the full market value of property was taxable; there was no separate definition of assessed value. In other words, taxes were based on a property's estimated market value. The market value was also the assessed value.

The passage of Measure 5 in 1990 cut tax rates by introducing tax rate limits. Measure 50 passed in 1997 cut taxes, introduced a maximum assessed value as the taxable value limit established for each property, and replaced most tax levies with permanent tax rates. Because real property is taxed on its assessed value, Measure 50 established the assessed value as the lower of its real market value or its maximum assessed value.

Your Assessment

The amount of property tax you pay is based on two things: 1) the assessed value of your property, and 2) the amount of taxes that each taxing district is authorized to raise. The Oregon Constitution places limits on both of these factors. It establishes a maximum assessed value and limits the increase of this value on an annual basis. The constitution also places a limit on tax rates for most of the taxing districts in the state. In this lesson, you will learn how value affects the taxes paid by owners of real property. Real market value and maximum assessed value are defined below.

Real Market Value (RMV)

Oregon law says the assessor must value all property at 100 percent of its real market value. Real market value (RMV) is typically the price your property would sell for in a transaction between a willing buyer and a willing seller on January 1, the assessment date for the tax year. To estimate the initial RMV for your property, your county assessor appraises your property using a physical inspection and a comparison of market data of similar properties. For ensuing tax years, your county assessor will study trends of similar properties to update the RMV for your property. Some property, such as farm or forest land, may be subject to special valuation processes.

Maximum Assessed Value (MAV)

A property's maximum assessed value (MAV) is the taxable value limit established for each property. The first MAV for each property was set in the 1997-98 tax year. For that year, the MAV was the property's 1995-96 real market value minus 10 percent. For example, if a residential property had a real market value of $100,000 for the 1995-96 tax year, its 1997-98 MAV would have been $90,000. Thereafter, the MAV increases are limited to 3 percent annually, unless certain restrictions apply, it does not meet the annual MAV test against the new RMV, or there is significant new property or new improvements to the property.

Taxes can increase for only certain reasons: the 3 percent annual increase in the MAV calculation, specific property events (usually new construction), or passage of voter approved special levy options such as public safety operations, or bonded indebtedness, i.e. school bonds, library bonds, etc. For a more detailed explanation of MAV and potential value and tax increases, refer to Oregon statutes beginning with ORS 308.146.

Paying taxes

1.1

Let's talk a little about taxes. Not all taxes are alike. For instance, take your Federal Income Tax. The more money you make, in general, the more tax you pay. Mr. Allen makes $58,000 a year. His neighbor, Mr. Brown, makes $64,000 a year.

Which man do you think probably pays more Federal Income Tax? (Decide on your answer and then check your answer in the Answer Section at the end of this lesson.)

_____ (Mr. Allen/Mr. Brown)

1.2

Mr. Brown and Mr. Allen both live in a state where they pay sales taxes. Mr. Brown, who makes $64,000 a year, buys a new color TV for $1,000. The sales tax, at 7 percent, is $70.

Mr. Allen, who makes $58,000 a year, goes to the TV shop to buy a $1,000 color TV for himself. How much will he pay in sales tax?

$_____. ($58/$70)

Mr. Brown has more money than Mr. Allen, but when he pays a sales tax on the same item, he pays the same tax.

This is also true of taxes on real property. You will see that shortly. But first, let us see what we mean by real estate or real property.

1.3

You cannot understand taxes on real estate unless you understand real estate. Real estate—or real property—is land and improvements to land. A building, a tower, or an in-ground swimming pool are examples of improvements to land.

Are the following real property?

a. A pasture Yes/No

b. An empty lot in town Yes/No

c. A barn Yes/No

d. A gas station Yes/No

e. A house Yes/No

f. The furniture in a house Yes/No

1.4

In general, personal property can be moved around easily. If you move to Florida, you take your personal property with you. Could you take your real property with you to Florida?

_____. Yes/No

1.5

In general, taxes on real property have nothing to do with the owner's ability to pay.

Suppose the assessor has placed an assessed value of $220,000 on both Mr. Brown's house and Mr. Allen's house. Neither is entitled to any exemptions on property taxes.

Which of the following is true?

a. Mr. Brown will pay more property tax than Mr. Allen.

b. Mr. Allen will pay more property tax than Mr. Brown.

c. Both Mr. Brown and Mr. Allen will pay the same.

1.6

Mr. Allen makes $58,000 and Mr. Brown makes $64,000. Yet they pay the same property tax. It may seem unfair. But remember, this tax is not on their incomes. It is on their real property. It is based on the fact that the tax assessor has placed an assessed value of $220,000 on both houses. The law requires that property taxes be levied on the assessed value of the property.

If the assessor gave Mr. Allen a break and appraised his house for less than its value, the assessment would be (within/outside) the law.

_____.

The store owner cannot charge a poor man 3 percent sales tax on a TV, and charge a rich man 7 percent. The tax is 7 percent for all.

The assessor cannot place a low value on one property and a high value on another unless their values really are that different!

And this raises an important point. Just what is value? How did the assessor decide that Mr. Brown's house was valued at $220,000? The following section will discuss property value.

What is value?

1.7

The word value can mean many things. As you will use it in placing a value on real property, it will mean just one thing.

The value of real property for tax purposes is what a willing buyer would typically pay a willing seller for it.

(Later on, we will take up what we mean by willing buyer and willing seller.)

Take a simple example. Mr. Jones puts his house on the market at $235,000. Along comes Mrs. Smith and offers $230,000. Jones accepts and agrees to sell Mrs. Smith his house for $230,000.

From this one sale, what is the indicated value of Mr. Jones' house?

_____. ($235,000/$230,000)

1.8

Mr. Martin built a house for $75,000. Fifteen years later, he sold it for $225,000. He was under no pressure to sell, and the buyer paid the price willingly.

1. What was Mr. Martin's cost when he built the house? _____.
2. At the time he sold it, what was the indicated value of Mr. Martin's house? _____.

1.9

You can see that cost and value is not always the same thing.

You could say, "But Mr. Martin only paid $75,000 for the house. A person would be a fool to pay three times that." But that is not what the rule says. Look at it this way.

1. Did Mr. Martin sell willingly? _____. (yes/no)
2. Did the buyer pay $225,000 willingly? _____. (yes/no)
3. What is the amount a willing buyer paid a willing seller? $ _____.
4. What is the indicated value of the house? $ _____.

1.10

Mr. Burns put his house on the market at $250,000. One person offered $200,000. Another offered $225,000. Another offered $210,000. Mr. Burns refused all three offers. He said he would not take less than $250,000.

Mr. Burns is a willing seller at $250,000. Is there a willing buyer at $250,000?

_____. (yes/no)

1.11

Several people seem to want to buy Mr. Burns' house. The highest offer was $225,000.

1. Was there a willing buyer at $225,000? (yes/no)
2. Was there a willing seller at $225,000? (yes/no)
3. Can you say the value of Mr. Burns' house is $250,000? (yes/no)
4. Can you say the value of Mr. Burns' house is $225,000? (yes/no)

1.12

An indicated value is established on a property when there is a willing _____ (realtor/buyer) and a willing _____. (seller/contractor)

1.13

If every property sold every year, the assessor's job would be easy. Every property bought by a willing buyer from a willing seller would have an indication of value. The assessor could simply adjust upward or downward for the conditions of the sale and put that value into their records.

But every property does not sell every year. Think about your community. What portion of the properties have sold in the last 12 months? One in 10? Three in 10? Your best guess is probably not a very large percent of them sold in the last year. That would be true in most places.

It is clear, then, that an assessor cannot get an indicated value for most properties they must appraise. The reason is that most of them have no willing buyer and willing seller at any given time.

When you cannot get an indicated value, you have to get an estimated value. This takes some special skill. This skill is what you will be learning in this course.

Estimating value

1.14

Suppose you want to buy a 3-year-old small pickup truck. You want to find out about how much you will have to pay for one.

You visit three used car lots. You see one such truck priced at $16,500. Another is $17,950. A third is $18,500.

1. What is the most you will probably have to pay for the type of truck you want?

_____ ($16,500/$17,950/$18,500)

2. What is the least you can probably pay for such a truck?

_____ ($16,500/$17,950/$18,500)

1.15

You can see that value can be estimated even when there is no known value. But estimating a value does not actually give that value to the property.

Suppose an assessor appraises the value of a property at $220,000.

1. Does that mean the owner cannot get more than $220,000 for it? _____ (yes/no)
2. Does it mean that someone will definitely pay as much as $220,000 for it? _____ (yes/no)

1.16

The estimate of value is only an estimate. We use our skill to estimate what a willing _____(contractor/buyer) would pay a willing _____ (seller/lessor).

1.17

For assessment purposes, the value of any property is an estimate of what amount?

_____

_____

_____ (your own words).

Lesson 1: Answers

1.1

Mr. Brown

He probably pays more because he makes more.

1.2

$70

He pays the same tax as Mr. Brown.

1.3

a, b, c, d, e

All are real property except f., furniture, which is an example of personal property.

1.4

No

You cannot move land, and most improvements would be hard to take that far.

1.5

c. Both pay the same

1.6

Outside

1.7

$230,000 (What a willing buyer did pay a willing seller.)

1.8

1. $75,000
2. $225,000 (What a willing buyer paid a willing seller.)

1.9

1. Yes
2. Yes
3. $225,000
4. $225,000

1.10

No (No one wants to pay what Burns is asking.)

1.11

1. Yes
2. No
3. No (There is no willing buyer at this price.)
4. No (There is no willing seller at this price.)

1.12

Buyer ... seller

1.14

1. $18,500

2. $16,500

1.15

1. No

2. No

1.16

buyer ... seller

1.17

The amount a willing buyer would typically pay a willing seller.

Introduction

Lesson 2: Selecting Your Approach

Introduction

You have learned that an appraiser working for a county assessor estimates the value of real property for tax purposes. They estimate what a willing buyer would typically pay a willing seller. In this lesson, we will introduce the three standard approaches to value. These are the ones used by all professional assessors and appraisers. You will learn how to choose the best approach for different situations. And you will learn how you can use two or even three approaches to value when appraising one property.

The Sales Comparison Approach to Value

The approach to value which often works best is called the sales comparison approach. It is sometimes called the market approach. When using this approach, you first must obtain actual sales information on properties similar to the property you are appraising. After analyzing this information, you arrive at an estimate of value. Let us take a closer look at the sales comparison approach.

What is market data?

2.1

Market data is information about property prices. It includes offers to buy or sell real property and actual sales prices.

Which of the following are examples of market data? (Check one or more.)

_____a. Ben Sitz puts his farm up for sale at $590,000.

_____b. Sharon Miller offers to buy the Petersons' house for $340,000.

_____c. Jack O'Brien sells his gas station to Abe Gitlitz for $440,000.

2.2

Just any market data does not provide enough information to make a good estimate of value. You must have data on properties that are very much like the one you are appraising.

Suppose you want to appraise a 3-bedroom house. Which of the following properties could you compare to it to find its value? (Check one or more.)

_____ a. An apartment house

_____ b. A farm

_____ c. A restaurant

_____ d. Another 3-bedroom house

2.3

You can estimate the value of one property by comparing it with another which has similar features and has recently sold. Such a property is called a comparable property. (Pronounced COMP-er-able, not com-PAIR-able.) A comparable property is a similar property which can be compared to the subject property—the property being appraised.

Suppose you want to appraise a 4-bedroom, 2-bathroom house. Which of the following properties is the most comparable? (Check one.)

_____ a. A 2-bedroom 1-bathroom house

_____ b. A 3-bedroom 3-bathroom house

_____ c. A 4-bedroom 2-bathroom house

2.4

There seems to be a rule about this. The rule is: the best comparable property is the one that is _____(most/least) like the one being appraised.

2.5

Using the sales comparison approach, you must have two or more properties to consider. The one you are appraising is the subject property. The ones you are comparing are the comparables, or comps.

Select either subject property or comp for the following properties:

Property A

3-bedroom house sold six weeks ago for $255,000. (subject / comp)

Property B

3-bedroom house now being appraised for tax purposes.

(subject / comp)

Property C

3-bedroom house for sale at $360,000. Highest offer to date: $340,000.

(subject / comp)

When to Use the Sales Comparison Approach

2.6

As you can see, you must be able to find comparable properties to use the sales comparison approach. You cannot compare the subject property with comparables unless there is sales information on the comparables.

In which of the following cases would you get the most reliable estimate of value by using the sales comparison approach? (Check one or more.)

_____ a. You have to appraise the only bowling alley in town.

_____ b. You have to appraise a 5-bedroom house. The biggest house in town to sell in the last 3 years has 3 bedrooms.

_____ c. You have to appraise a 2-bedroom house. Four houses very much like it have sold in recent months.

2.7

To use the sales comparison approach, you must have two conditions.

1. There must be _____ (contradictory/comparable) properties.
2. There must be _____ (sales or market/listing) data on such property.

2.8

The sales comparison approach to value is generally the preferred approach to use for estimating value. It works more often than the other two. But you cannot always use it.

To use the sales comparison approach, there are two conditions which must exist. Check these two conditions on the list below.

_____ a. You must know the cost of the subject property.

_____ b. There must be comparable properties.

_____ c. You must know how much income could be obtained from comparable properties.

_____ d. You must have sales data on comparable properties.

The Income Approach to Value

The sales comparison approach to value will not always work. When it will not work, you have to use another approach such as the income approach. This approach to value is based on the potential income that the property could earn for its owner.

2.9

Which of the following types of property could earn income for their owners? (Check all that apply.)

_____ a. A church

_____ b. An apartment house

_____ c. A store property

_____ d. An office building

2.10

The potential income a property can earn can be used to estimate a value for it.

Here is an example. A one-story store building in a small town rents for $24,000 a year. The owner's expenses are $14,000 a year. Their net income (what is left) is $10,000 a year.

You have some money to invest. It is now in the savings bank, and you earn 5 percent a year on it.

1. Would you pay $180,000 for this store property? (Calculate what you could get at the bank before you answer. Do not take risk into account.) _____.
2. Would you pay $210,000? _____.
3. Would you pay $230,000? _____.

2.11

An investor typically will not pay more for an income property than it is worth to them. If you can earn 6 percent on your money invested in bonds, would you buy a building on which you can earn 4 percent? _____. (yes/no)

2.12

The value of an income property is typically determined by the income it can potentially earn. Thus, if the appraiser can confirm what the income is—or estimate what it could be—they can estimate the value of the property using the _____ (sales comparison/cost/income) approach.

2.13

To use the sales comparison approach, you must be able to obtain reliable data on sales of comparable properties.

If you cannot get such information, you may be able to use the income approach to estimate value. In this case, the property must be one which typically could or does produce _____. (income/comparables)

Sometimes you will have to appraise a property and no sales data on comparable properties can be found. You determine the sales comparison approach is not valid due to a lack of comparable sales, but the income approach is appropriate due to the amount of rental data available.

Sometimes you will not have enough information to use the income approach either. If the property is one that would not normally produce income, you should not use the income approach, e.g. single family home.

There are three standard approaches to value. If you cannot use either the sales comparison or the income approach, you will have to use the third. That is the cost approach, which you will learn about in the next section.

The Cost Approach to Value

2.14

The third way to estimate value is to answer the question, "What would it cost to build a structure like this one?"

For example, suppose you appraise a single family house built in 1925. After much research, you conclude that one just like it could be built at a cost of $120,000.

The value of that house on a cost basis, then, is how much? _____. ($120,000/$100,000)

2.15

You can see right away that there can be problems with using just cost. The main issue is that the house was really built in 1925, not today. It is worn. A new one would not be worn. The loss in value from age and wear is called depreciation.

A more appropriate estimate of value can be developed by estimating the cost to replace the structure, minus depreciation.

Here is an example. Fill in the blank line below.

$120,000	Cost to replace
- 40,000	_____
$ 80,000	Value, on a cost basis

2.16

To estimate the value of a property on a cost basis, you first must determine how much it would cost to _____ (replace/remodel) it.

2.17

From the replacement cost for the property, you deduct the amount the market recognizes as _____ (comparison/depreciation) caused by age and wear.

The cost approach can be difficult to use. You have to know a lot about construction. You also have to know a lot about depreciation. And even if you do know a lot about both, you are still estimating, just as in the other approaches.

You have to estimate replacement cost. Then you have to measure market depreciation.

Let us examine another problem that an appraiser encounters when using the cost approach.

2.18

Mrs. Miller, a 75-year-old widow, lives up on the hill in a 14-room Victorian house built in 1890. It has seven bedrooms, a parlor, a butler's pantry, and six fireplaces. To build such a house today would cost a fortune.

Suppose you use the cost approach on this house. How likely is it that Mrs. Miller, or anybody else, would have the house replaced exactly as it is now? _____. (not very likely/more than likely)

2.19

What is the point in estimating the replacement cost of a building no one would want to replace? _____. (good office practice/not much point)

2.20

The cost approach can be difficult to use. There are many situations where it is not appropriate to use. But sometimes it works better than the income or sales comparison approach. Here is an example:

A shopping center is being built in a small community, and you have an assignment to appraise it. It is framed, the roof is on, and the walks, partitions, and parking are currently being built.

1. Can you use the sales comparison approach? _____ (yes/no)
2. Explain your answer to #1. _____ _____
3. Can you use the income approach? _____ (yes/no)
4. Explain your answer to #2. _____ _____

2.21

The incomplete shopping center would typically be appraised using the cost approach—because there is not enough valid data to use other approaches that will result in a valid estimate of value.

The cost basis can be used in other situations, too. New single family houses can be appraised on a cost basis. So can special purpose buildings such as hospitals, nursing homes, and industrial manufacturing facilities.

In general, the cost basis of estimating value is appropriate (when other approaches will not work/regardless of the type of property).

Review

2.22

You have been introduced to three standard approaches to value. List them below.

1. _____.
2. _____.
3. _____.

2.23

1. The approach to value that will most often produce the best result is the _____ (cost/income/sales comparison) approach.
2. When there is no sales data available and the property is income producing, you then would try to apply the _____ (cost/income/sales comparison) approach.
3. If the subject property cannot be compared with others like it that have sold, and does not produce income, you would use the _____ (cost/income/sales comparison) approach.

Using More Than One Approach

There is usually one approach to value which is best for each property. By "best," we mean it gives you the most valid estimate of value.

Assessors and appraisers usually use more than one approach on a single property when possible. The reason is to check one estimate against the other to be sure the value estimate is correct. Let us see how this works.

2.24

An appraiser estimates the value of a 1-year-old house in a newer development. Houses just like it in the neighborhood are selling in the range of $350,000 to $360,000.

The appraiser determines that a value of $355,000 is appropriate for the subject property. The appraiser estimates the land is worth $55,000. The value of the house alone, then, would be $_____.

2.25

The appraiser in this case is not absolutely sure they are right about this estimate of value. They want to use a second approach as a check against the first approach. (Keep in mind that the appraiser is appraising a 1-year-old house in a development.)

Which other approach would you recommend the assessor use? _____. (cost/income/sales comparison)

2.26

In this case, the appraiser's job is easy. The builder who built the subject property is still developing other areas. In fact, they are building houses just like the subject property, but in another comparable area.

The builder informs the appraiser that their cost including profit on that model is now about $303,000, not including land.

In this case, the cost approach showed that the sales comparison approach was _____ (valid/invalid).

2.27

Here is another example. A shopping center costs $3 million to replace, including the land. It was assessed using the cost approach. The assessor wanted to check the appropriateness of the assessment and used the income approach as a check. The shopping center has not been very successful. The assessor determined that a prudent investor would pay $2,225,000 for the center based on its actual annual income.

The income approach, in this case, showed that the cost approach overestimated the value of the shopping center.

By using the income approach as a check against the assessed value, the assessor determined that the cost approach was _____. (valid/invalid)

Practice

In assessment work, you will often use two and sometimes all three approaches to value. In most cases, one approach will give you the best estimate of market value, depending on the property type. In each of the next eight questions is an example of a property you might be asked to appraise. In each situation, decide which of the three approaches to value would probably give you the best estimate of value.

2.28

A 40-year-old single family residence occupied by the owner and his family.

Best approach: _____.
(cost/sales comparison/income)

2.29

The headquarters building of the Loyal Order of Moose. (cost/sales comparison/income)

Best approach: _____.

2.30

Land on which a tenant operates a very busy parking lot. (cost/sales comparison/income)

Best approach: _____.

2.31

A store building with two floors of apartments above the store. (cost/sales comparison/income)

Best approach: _____.

2.32

A 20-year-old duplex. (cost/sales comparison/income)

Best approach: _____.

2.33

Suppose you find there is no market data on duplexes. (cost/sales comparison/income)

What's the next best approach?
_____.

2.34

A manufacturing plant built in 1870 for textiles. It is now occupied by a tenant, an electronics company. There are no other factories in town. (cost/sales comparison/income)

Best approach: _____.

2.35

A dairy farm, occupied and operated by the owner. (cost/sales comparison/income)

Best approach: _____

Lesson 2: Answers

2.1

All three are examples of market data. (The first is an offer to sell. The second is an offer to buy. The third is an actual sale.)

2.2

d. Another 3-bedroom house

2.3

c. a 4-bedroom, 2-bathroom house

2.4

Most

2.5

Property A: Comp

Property B: Subject property

Property C: Comp

2.6

c. You have nothing to compare with the bowling alley and no 5-bedroom houses have sold. To use the sales comparison approach to appraise the bowling alley or the 5-bedroom house, you will have to get data from other areas.

2.7

1. Comparable

2. Sales or market

2.8

b. There must be comparable properties

d. You must have sales data on comparable properties

2.9

All properties could earn income by being rented.

2.10

You can do as you please, but:

1. If you buy the store at $180,000, you will earn $10,000 a year instead of $9,000 at the bank.
2. If you buy the store at $210,000, you will earn $10,000 a year instead of $10,500 at the bank.
3. If you buy the store at $230,000, you will earn $10,000 a year instead of $11,500 at the bank.

In other words, at any price up to $200,000, it's a good deal. If you pay over $200,000, you are losing money.

2.11

No (You probably would not.)

2.12

Income

2.13

Income

2.14

$120,000

2.15

Depreciation

2.16

Replace

2.17

Depreciation

2.18

As you wish. We think it's not very likely.

2.19

We think there is not much point. (But sometimes the assessor must do it because it is the only available way they have of arriving at a value estimate.) The sales comparison approach would be more appropriate in this instance to estimate the market reaction to this type of house.

2.20

1. No
2. (In your words) You would have to have sales data on similar incomplete shopping centers which have sold.
3. No
4. (In your words) The incomplete building cannot produce income.

2.21

When other approaches will not work

2.22

(Any order)

1. Sales Comparison
2. Income
3. Cost

2.23

1. Sales comparison
2. Income
3. Cost

2.24

$300,000

2.25

The cost approach is best. (Most single-family homes are not used as income properties.)

2.26

Valid

2.27

Invalid

2.28

Sales comparison (If you can find comps that have sold.)

2.29

Cost (There are no comps, and it produces no income.)

2.30

Income (Use the net rental derived from the land.)

2.31

Income (This approach could be checked with the sales comparison approach—but the question here is which approach would probably give the best estimate.)

2.32

Sales comparison

2.33

Income

2.34

Income

2.35

Sales comparison

Introduction
Lesson 3: Calculations

Introduction

A good appraisal generally requires the use of area measurements in some way. We compare lot sizes by square footage. We give construction costs by price per square foot.

You must be able to compute the area of lots and the amount of floor space in buildings. Many lots and buildings will be rectangular in shape, but there are some that are irregularly shaped.

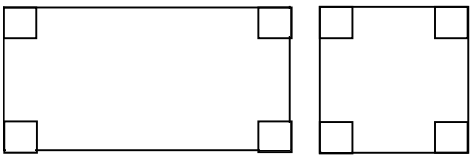
This chapter will show you how to compute the area of regular and/or irregular shapes, land parcels, or structures.

Finding the Area of a Regular Figure

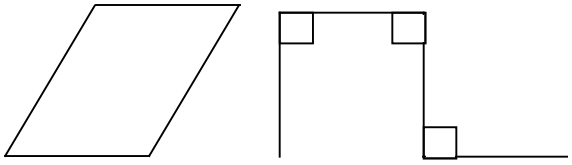
Rectangles

A closed figure with four sides and all square corners is a rectangle.

Which of the following figures are *not* rectangles?



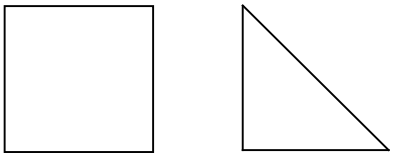
1 2



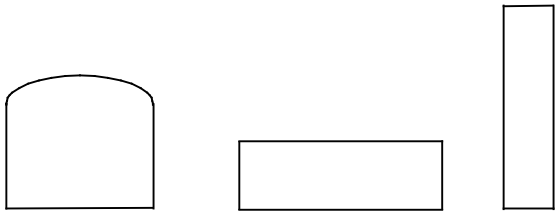
3 4

You will see that #3 does not have square corners and that #4 is not a closed figure.

Which of the following *are* rectangles?



1 2



3 4 5

Numbers 1, 4, and 5 are all rectangles.

Squares

A square is a rectangle with all sides the same length.

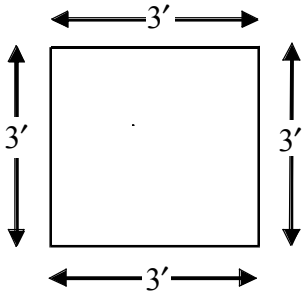


Figure 1

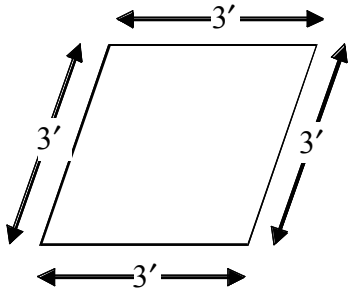


Figure 2

3.1

Figure 1 is a square. Figure 2 is not a square. Why is figure 2 not a square? _____

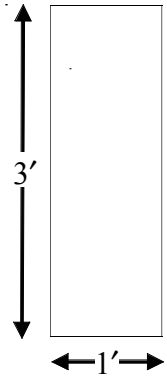
_____

(in your own words).

Area

3.2

Area is the space contained in a closed figure. Area is measured in square units.



The area of the figure above is _____ (3 feet/3 square feet/4 square feet)

3.3

A square with 1-foot long sides covers an area of 1 square foot. For example, a ceramic tile that is 1 foot long by 1 foot wide covers 1 square foot of floor. Look at Figure 1 below. It represents 1 square foot.

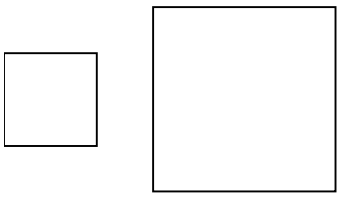


Figure 1 Figure 2

How many squares the size of Figure 1 will fit in Figure 2? _____ (1/2/3/4)

3.4

Figure 1 below contains 6 square feet. You can multiply 2′ times 3′ to get 6 square feet. Multiplying length and width of a rectangle gives the number of square units covered by the figure. This is known as the area of the figure.

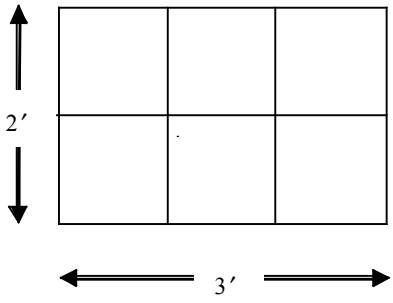


Figure 1

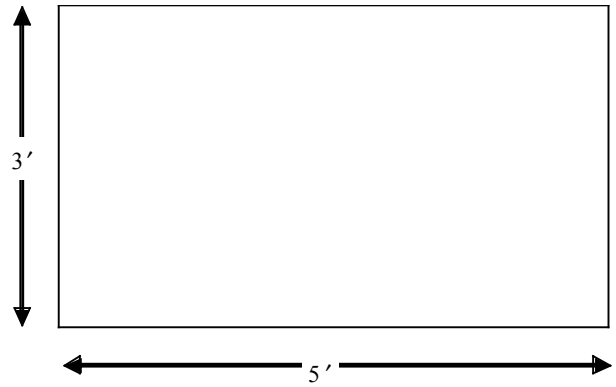


Figure 2

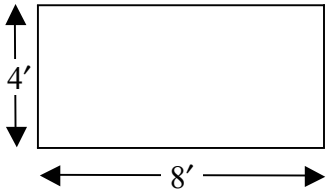
What is the area, in square feet, of Figure 2?

_____ (8 sq. ft./15 sq. ft./6 sq. ft.)

3.5

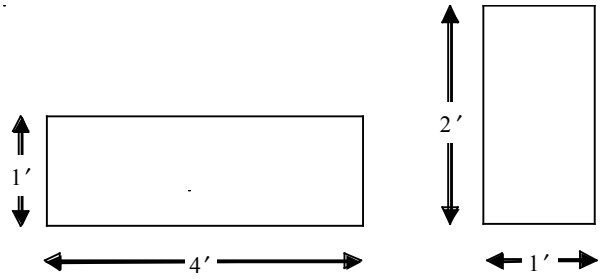
Find the area of a bathroom with dimensions as given below. _____

Choose one: 12 sq. ft./32 sq. ft./24 sq. ft./32 ft.

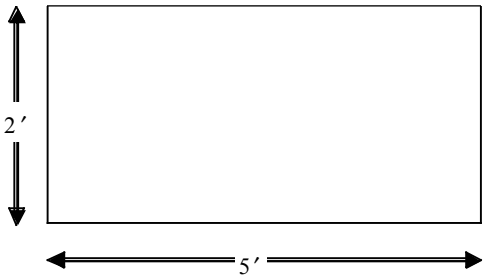


3.6

Compute the area of the following figures.



1 2



3

Figure 1 _____
(4 square feet/4 feet/5 square feet)

Figure 2 _____
(3 feet/3 square feet/2 square feet)

Figure 3 _____
(10 feet/10 square feet/7 square feet)

Using like measures

3.7

When we compute area, all of the dimensions used must be given in the same unit of measurement. If one dimension is given in inches and the other in feet, one of the dimensions must be converted. For instance, a room is 60 inches wide by 9 feet long. We must change the 60 inches to 5 feet by dividing by 12, or change the 9 feet to 108 inches by multiplying by 12. Generally, in appraising, we use feet as our basic unit. So the room is given as 5′ by 9′.

9 feet by 72 inches becomes 9 feet by

_____ (6 feet/8 feet/9 feet)

3.8

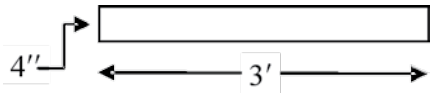
Which of the following pairs can be multiplied together to get area?

1. inches x inches
2. inches x feet
3. feet x yards
4. yards x inches
5. feet x feet

Choose one: all of the above/only #1 and #5/all but #1 and #5

3.9

Find the area of the figure below.



Choose one: 12 square feet/1 square foot/144 square inches

3.10

Compute the area of the following figures:

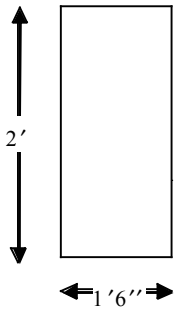


Figure 1

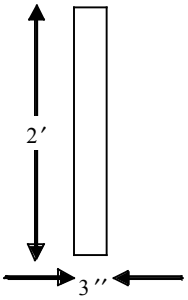


Figure 2

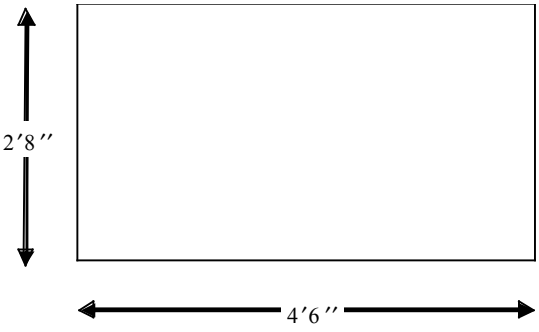
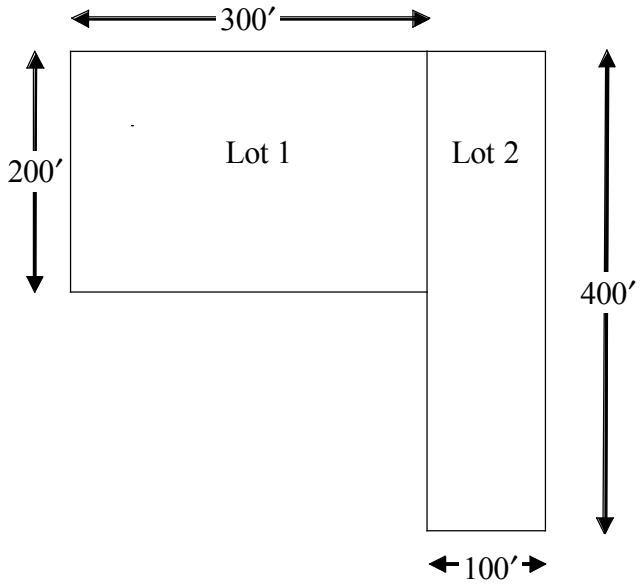


Figure 3

Area of irregular figures

3.11

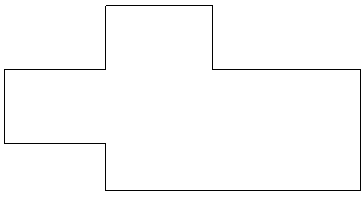
Sometimes lots are combined. This can produce irregular figures. For example, the following is a sketch of two adjoining lots.



1. What is the area of Lot 1? _____
2. What is the area of Lot 2? _____
3. What is the total area of both lots? _____

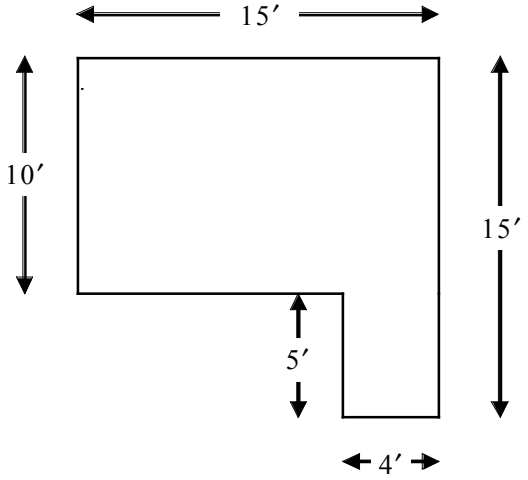
3.12

You calculated the total area of two rectangular lots by adding together their separate areas. Make three rectangles by drawing two lines in the irregular figure below.



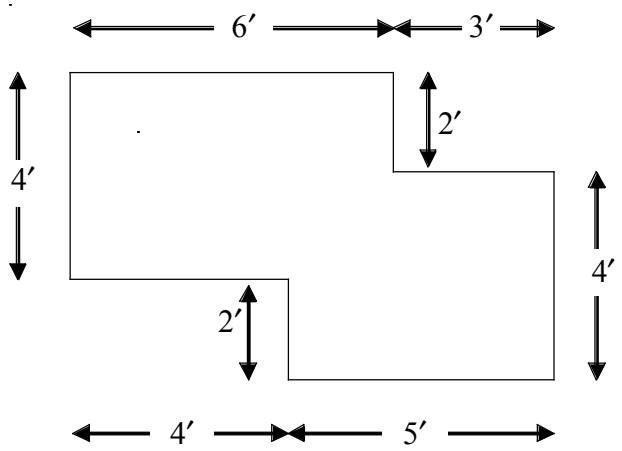
3.13

Divide the following figure into rectangles and find the total area of the figure. _____ sq. ft.

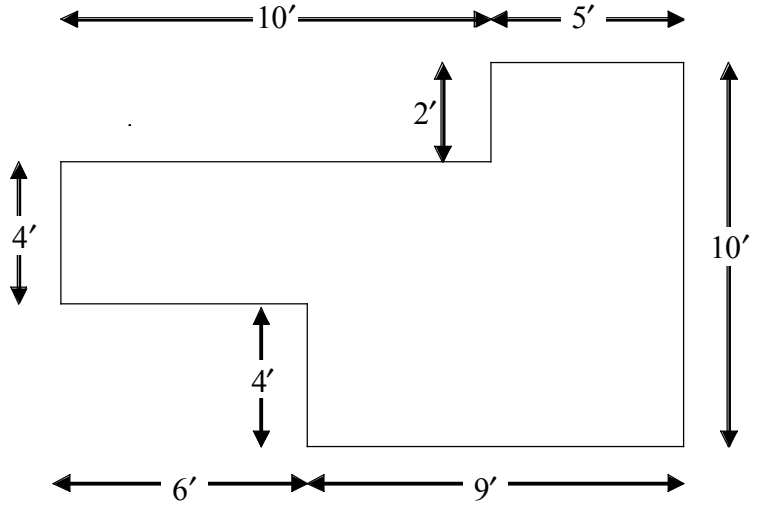


3.14

Find the total area of each of the following lots.



Lot 1



Lot 2

3.15

When two lines meet to form a square corner (right angle), they are said to be perpendicular.

Look at Figure 1. Lines AB and CD are perpendicular.

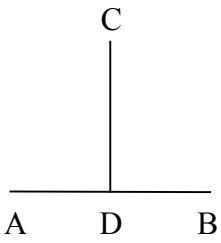


Figure 1

Look at Figure 2. Are lines AC and BD perpendicular? Yes, they meet to form a right angle or square corner.

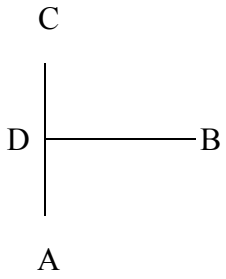
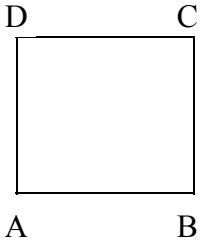


Figure 2

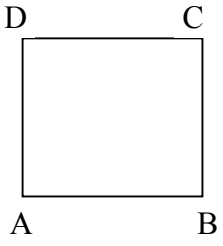
In the figure below, what lines are perpendicular to AB? _____

(line CB or BC/line AD or DA/line CD or DC)

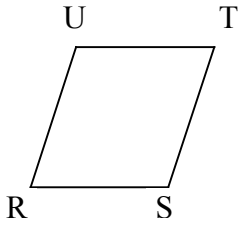


3.16

The rectangle below is sitting on side AB. The side a figure rests on is usually called its base.



What side is most likely called the base in the figure below? _____



(line RU or UR/line UT or TU/line RS or SR/line ST or TS)

3.17

Look at Figure 1 below. A line, DE, begins at corner D and is perpendicular to the base AB. The length of line DE is the height of Figure 1. We call line DE the altitude of Figure 1. An altitude must meet two conditions: (1) begin at the highest point opposite the base; (2) be perpendicular to the base.

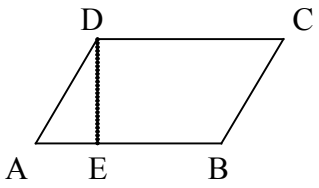


Figure 1

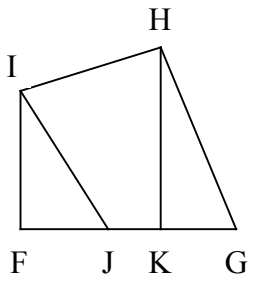


Figure 2

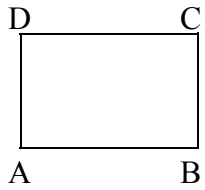
What line is the altitude to the line FG in Figure 2? _____

(line IF/line IJ/line HK/line HG)

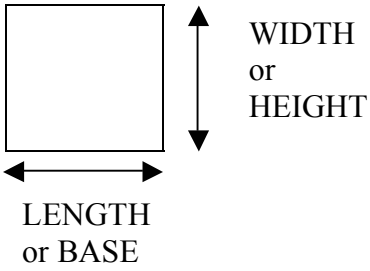
3.18

Look at the following rectangle. AB is the base. Which line is the altitude? _____

(line AB/line AD/line DC/line BC)



Look at the figure below. We have given two names to each dimension of the rectangle.



The lengths of the dimensions have not changed. The products of these dimensions are not different if we multiply base x height instead of length x width. The area remains the same.

3.19

All lots are not rectangles. Two lines that are the same distance apart throughout their lengths are called parallel lines. When a figure has both pairs of opposite sides parallel and equal, it is called a parallelogram.

Figure 1 is a parallelogram.

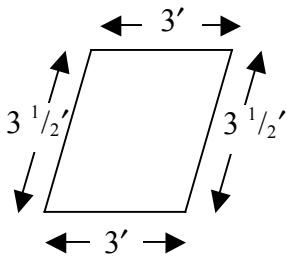


Figure 1

Is Figure 2 a parallelogram? _____ (yes/no)

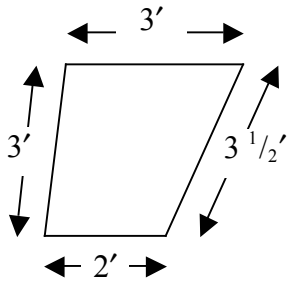


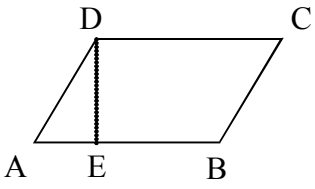
Figure 2

3.20

Look at the following parallelogram.

What line is the base? _____ (AE/AB/EB/AD/DC/CB)

What line is the altitude or height? _____ (AE/AB/EB/DE/AD/DC/CB)



3.21

Imagine the triangular section A on the left side of Figure 1 below being moved to the right hand side to make Figure 2.

Figure 1

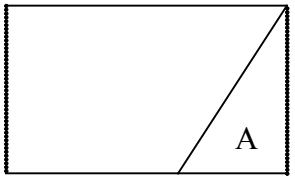


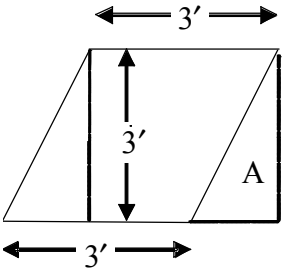
Figure 2

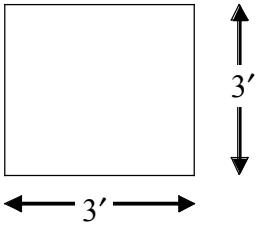
1. Is Figure 1 a rectangle? _____ (yes/no)
2. Is Figure 2 a rectangle? _____ (yes/no)
3. Is the area of the two figures equal? _____ (yes/no)

3.22

Look at the two figures below. The areas are equal.

1. Are the bases equal in length? _____ (yes/no)
2. Are the heights equal? _____ (yes/no)

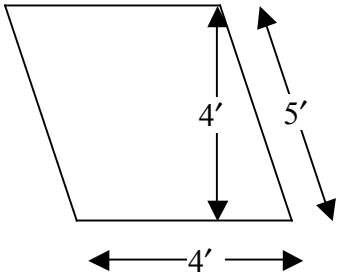




3.23

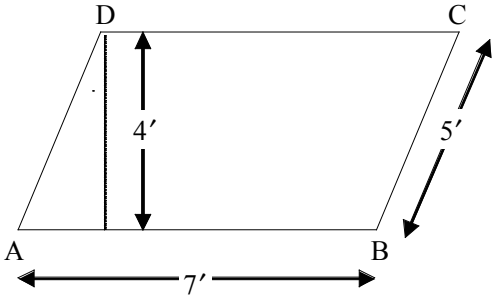
The area of a parallelogram can be found by multiplying the length of the base by the height.

Find the area of the figure below.



3.24

Find the area of the figure below.



3.25

Find the areas of the figures below:

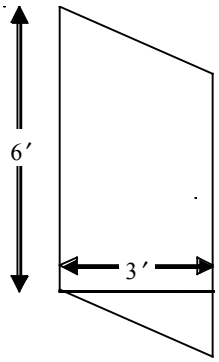


Figure 1

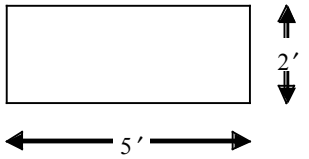


Figure 2

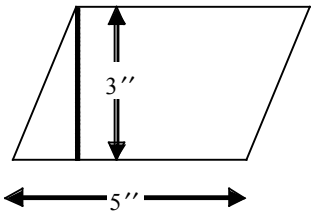
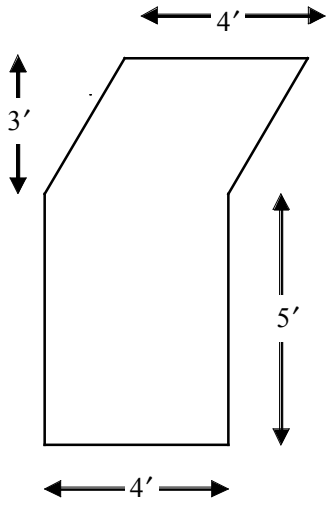


Figure 3

3.26

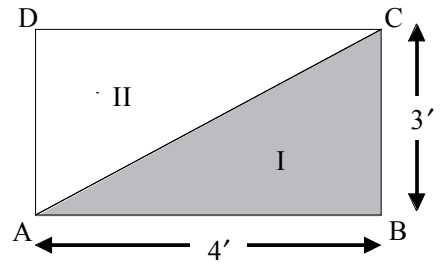
Find the area of the figure below. (Remember you can make simple figures from composite figures by drawing lines.)



Finding the area of triangles

3.27

Look at the rectangle below. It has been cut into two identical triangles, Triangle I (shaded) and Triangle II (unshaded).



1. What is the area of the rectangle?
2. What part of the area of the total figure is the area of Triangle II?

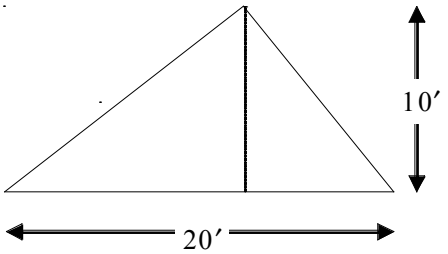
3.28

The area of a triangle can be found by multiplying its base times its height and dividing by two.

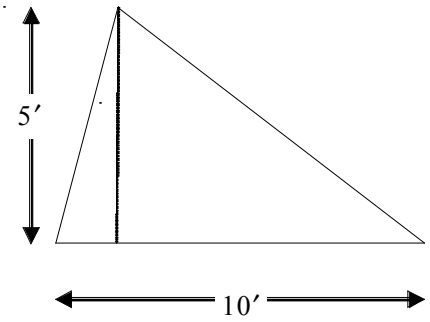
$$A = \frac{bh}{2}$$

In Figure 1 below, the area can be found like this:

10′ x 20′ = 200 sq. ft. ÷ 2 = 100 sq. ft.



Find the area of the triangle below.



3.29

Find the areas of the triangles below.

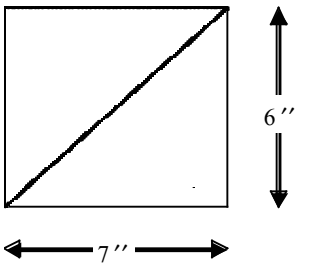


Figure 1

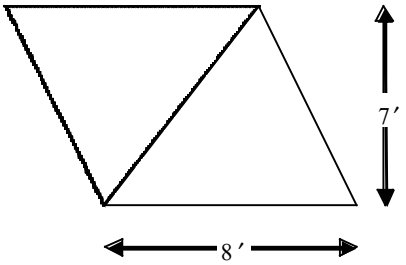


Figure 2

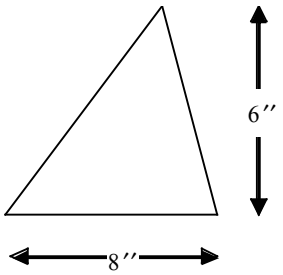
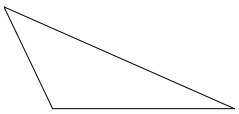


Figure 3

3.30

Suppose the triangle looks like this:



We can get the height by dropping a perpendicular to the extension of the base line as illustrated in Figure 1 below. Look at Figure 2. It is the same triangle rotated so that the base is different.

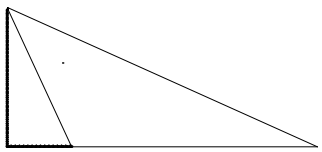


Figure 1

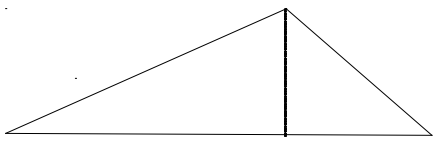
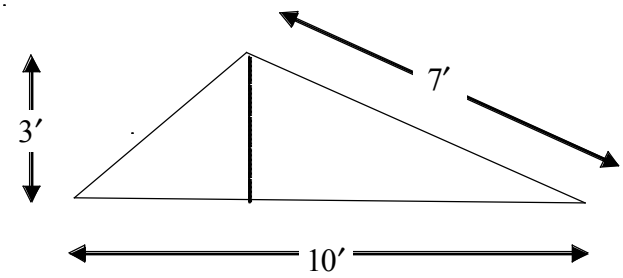


Figure 2

Will you get the same answer for the area when you use a different base and height? (yes / no)

3.31

In the example above, the figure does not need to be rotated. Change the way you look at it. For example, in the figure below, the height (3′) is drawn without changing the position of the figure on the paper.

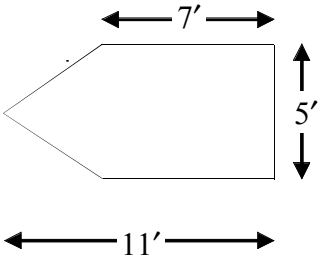


1. How long is the height of the figure?
2. How long is the base of the figure?
3. What is the area?

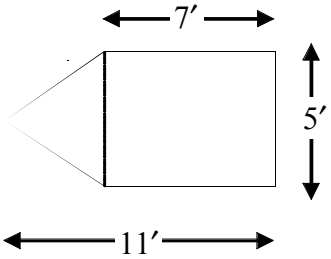
3.32

Earlier in this study, we broke some irregular lots down to rectangles to make it easy to find their areas. Use the same approach on more complicated irregular lots. For example, the figure below has been broken down into smaller parts.

Figure 1:



Step 1: Break into smaller parts



Step 2: Calculate area of each part.

5 x 7 =	35	sq. ft.
(11 - 7 = 4)		
4 x 5 ÷ 2 =	10	sq. ft.
	45	sq. ft.

Find the areas of the composite figures below:

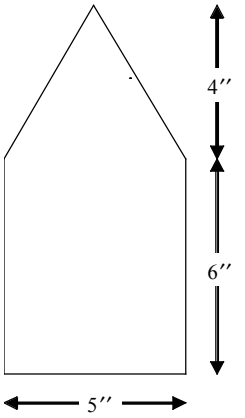


Figure 1

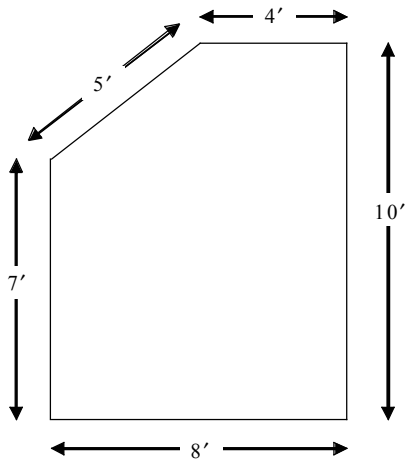


Figure 2

3.33

Now use this approach to find the areas of the following figures.

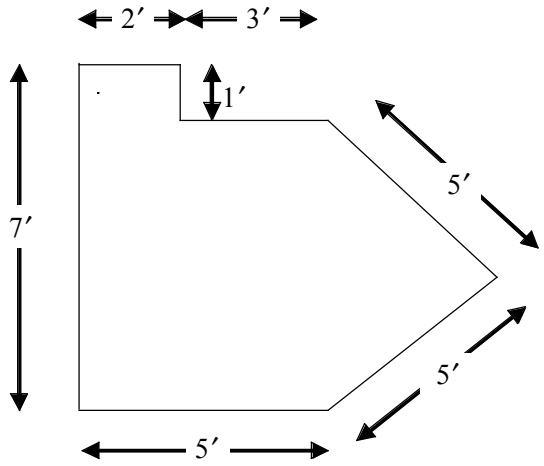
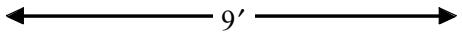


Figure 1



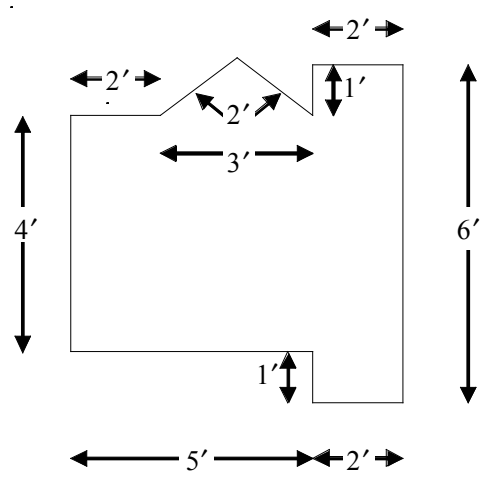


Figure 2

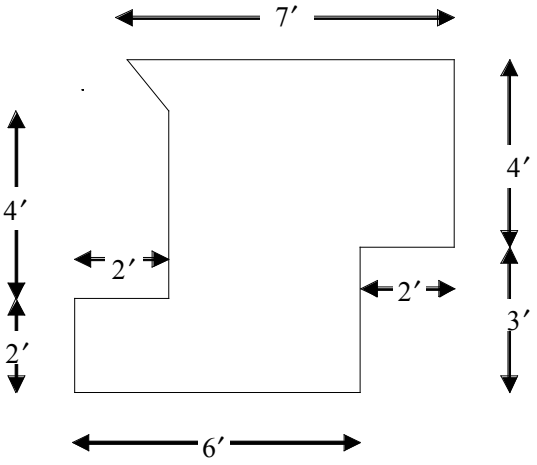


Figure 3

Finding the selling price per square foot

3.34

Now that you know how to calculate the area of regular and irregular lots and buildings, you can learn how to put this skill to work. To work effectively with comparables, you must be able to determine the price per square foot of lots, rooms, and buildings.

For example, you are appraising a lot 12,000 square feet in area. Your comparable is a lot 11,000 square feet in area. The easy way is to find the cost per square foot of the comparable and multiply by 12,000.

A statement of the amount of one thing per unit of something else is a rate. For example, speed is a rate: the number of miles (distance) per hour (one unit of time).

Is price a rate? _____ (yes/no)

3.35

Lots on a certain road are selling at $100 per front foot. Is this a rate? _____ (yes/no)

3.36

Price is always given as a rate, sometimes it does not seem so. For instance, $2.20 for 10 pounds of potatoes is a price. The unit is 10 pounds as it is given above. We change this to a unit of 1 pound by dividing the number by itself (10). One catch: we must also divide the other number by 10.

$\frac{220 \text{ cents}}{10}$ per $\frac{10 \text{ pounds}}{10}$ = 22 cents per 1 pound

This is called *reduction to lowest terms*.

Reduce the price below to lowest terms.

$3.50 per 5 pounds = _____
($7.00 per pound/$.70 per pound/$.07 per pound)

3.37

Reduce the rate below to lowest terms.

$50,000 per 20 acres = _____ per _____.

3.38

Of course, once you understand the necessity of reducing the fraction to the lowest terms, you can dispense with the rather awkward equation and merely divide the price by the unit. The reduction to lowest terms becomes a mental calculation:

$3.50 per 5 pounds becomes:

$\frac{\$3.50}{5}$ = $.70 per pound

Try these:

$6.40 was paid for 8 pounds of fruit. What was the price paid per pound?

$\frac{\$6.40}{8}$ = _____ per pound

$11.40 was paid for 6 pounds of meat. What was the price paid per pound?

$\frac{\$11.40}{6}$ = _____ per pound

3.39

To find the price per square foot of a property, reduce the price rate to lowest terms. A piece of land 5,000 square feet in area sold for $60,000.

The price per square foot can be found as below:

Price		Area
$\frac{\$60,000}{5,000}$	per	$\frac{5,000}{5,000}$

$12.00 per 1 sq. ft.

Find the construction cost per square foot of a house that contains 2,000 sq. ft. and cost $300,000 to build. _____ per 1 sq. ft.

3.40

Find the selling price per square foot of the following properties.

1. A lot 200 ft. by 60 ft. that sold for $60,000. _____
2. A house with a total floor area of 1,600 sq. ft. that sold for $180,000. _____

You have concluded the introductory lessons to the Three Approaches to Value and are ready to begin studying each of the approaches individually. The first approach you will study is the Cost Approach, followed by the Sales Comparison Approach, then the Income Approach.

Lesson 3: Answers

3.1

Figure 2 does not have square corners, or Figure 2 is not a rectangle; therefore, it cannot be a square.

3.2

3 square feet

3.3

4 (four)

3.4

15 sq. ft.

By multiplying 3 feet times 5 feet or 5 feet times 3 feet, you will reach the correct answer of 15 square feet.

3.5

32 sq. ft.

3.6

Figure 1: 4 square feet

Figure 2: 2 square feet

Figure 3: 10 square feet

3.7

Six feet

3.8

#1 and #5

Like units of measurement must be used to get area.

3.9

1 square foot

If you chose 144 square inches, your answer is correct. However, we will generally use feet as our basic unit of length. Therefore, the better choice was 1 square foot. Remember: To convert from inches to feet, divide by 12.

For example: 3″ becomes $^{3}/_{12}$′ or ¼′.

3.10

Figure 1: 1′6″ = 1½′ then 1½′ x 2″ = 3 square feet

Figure 2: 3″= ¼′ then ¼′ x 2′ = ½ square foot

Figure 3: 4′6″ = 4½′

2′8″ = 2 ⅔′

4½′ x 2⅔ = ⁹⁄₂ x ⁸⁄₃ = ⁷²⁄₆ = 12 square feet

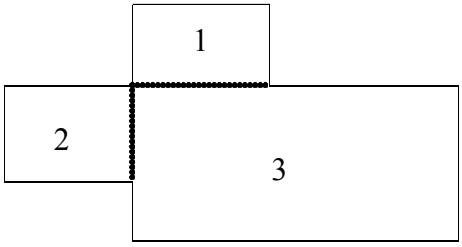
3.11

1. 60,000 sq. ft

2. 40,000 sq. ft

3. 100,000 sq. ft

3.12



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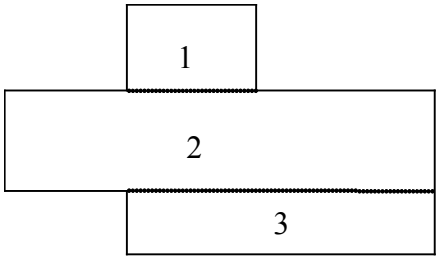

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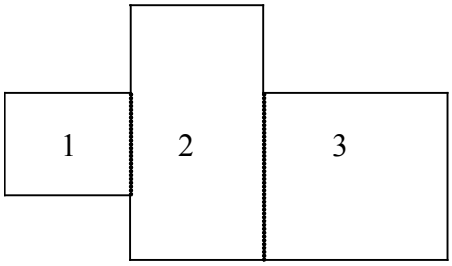
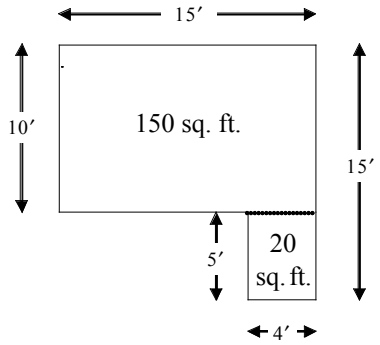


3.13

170 square feet



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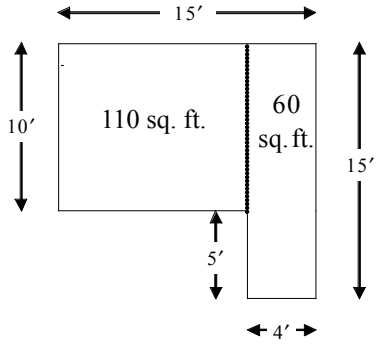


3.14

Lot 1: 40 square feet

Lot 2: 106 square feet

3.15

Line CB (or BC) and line AD (or DA)

3.16

Line RS (or SR)

3.17

Line HK

3.18

Lines AD and BC are both altitudes

3.19

No, it does not fit the conditions.

3.20

Line AB is the base.

Line DE is the altitude or height.

3.21

1. No, it is a parallelogram.

2. Yes

3. Yes, they cover the same amount of space.

3.22

1. Yes

2. Yes

3.23

16 square feet

3.24

28 square feet

3.25

Figure 1: 18 square feet

Figure 2: 10 square feet

Figure 3: 15 square inches

3.26

32 square feet

The height of the parallelogram is 3 ft. and the base is 4 ft. The area is 12 sq. ft.

The rectangle is 20 sq. ft. Total area of the figure is 32 sq. ft.

3.27

1. 12 square feet

2. Half, or 6 square feet

3.28

25 square feet

5′ x 10′ = 50 sq. ft ÷ 2 = 25 sq. ft.

3.29

Figure 1: 21 square inches

Figure 2: 28 square feet

Figure 3: 24 square inches

3.30

Yes, the area of the figure remains unchanged.

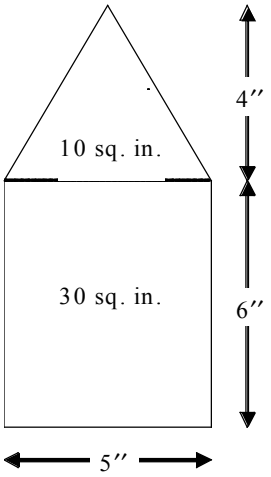
3.31

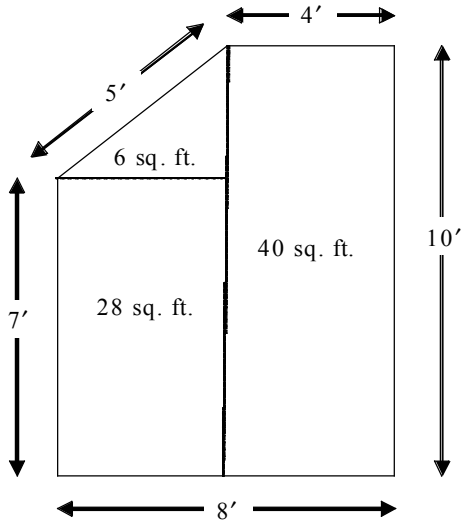
1. The height is 3 feet
2. The base is 10 feet
3. The area is 15 square feet

3.32

Figure 1: 40 square inches

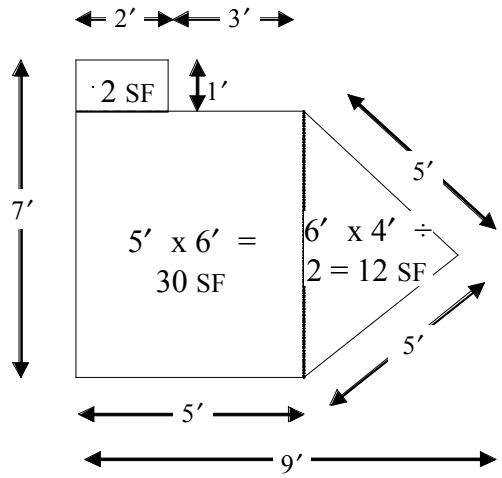
Figure 2: 74 square feet





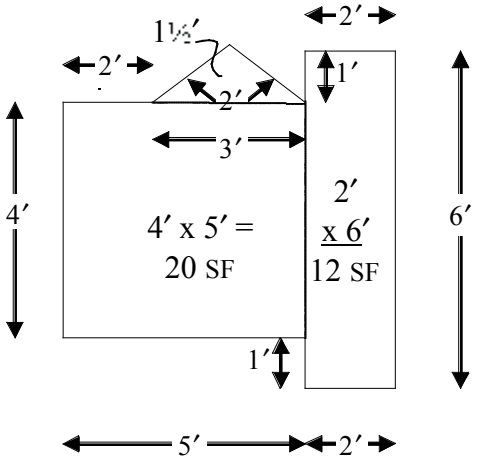
3.33

Figure 1: 44 square feet



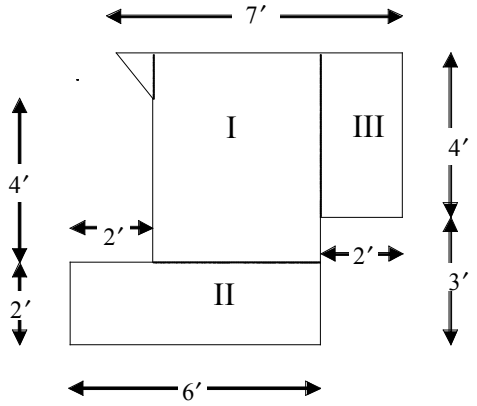
30	sq. ft.
12	sq. ft.
2	sq. ft.
44	sq. ft

Figure 2: 33½ square feet



Triangle	1½	sq. ft.
Rectangle I	20	sq. ft.
Rectangle II	12	sq. ft.
	33½	sq. ft

Figure 3: 40½ square feet



Triangle	½	sq. ft.
Rectangle I	20	sq. ft.
Rectangle II	12	sq. ft.
Rectangle III	8	sq. ft.
	40½	sq. ft

3.34

Yes, amount of some sort of currency per unit of an item.

3.35

Yes

3.36

$.70 per pound

3.37

$2,500 per acre

3.38

$.80 per pound

$1.90 per pound

3.39

$150.00 (per 1 sq. ft.)

3.40

1. $5.00 per square foot

2. $112.50 per square foot