MAAO
Minnesota Association of Assessing Officers

"PREPARING FOR THE MINNESOTA INCOME PROPERTY CASE STUDY EXAM" WORKSHOP

Revised September, 2018

PREPARING FOR THE MN INCOME PROPERTY CASE STUDY EXAM WORKSHOP OBJECTIVES

- This workshop will review the three approaches to value with an emphasis on the income approach. The workshop is intended for assessors planning to take the MN Income Property Case Study Exam. Topics include:

- Review of units and elements of comparison
- Review of the reconstruction of an operating statement
- Review of the calculations for the various levels of income
- Review of operating expense and net operating income ratios
- Review of the calculation of a discount, recapture, and effective tax rate
- Review of statistical calculations in the sales ratio process
- Review of the calculation of a debt coverage ratio and mortgage constant
- Review of the five methods of calculating an overall capitalization rate
- Review of the residual techniques used in the Income Approach
- Review of the use of a cost manual
- Review of the calculation of annual depreciation
- Review of deriving adjustments using the Potential Gross Income Multiplier
- Review of calculating market conditions adjustments
- Review of capitalization of rent differences to derive adjustments for use in the Sales Comparison Approach

MINNESOTA INCOME PROPERTY CASE STUDY EXAM

The purpose of the exam is to provide a method to achieve the designation level of Senior Accredited Minnesota Assessor (SAMA). Since the exam is an alternative to writing a narrative appraisal report on an income producing property, the emphasis of the exam is on the income approach.

The candidate does not have be an Accredited Minnesota Assessor (AMA) to take the exam, however, it is strongly recommended that the candidate has completed all the AMA requirements.

The exam is in two parts. Part 1 is in three sections; Section 1 is comprised of 25 multiple choice questions with an emphasis on the income approach and statistics. The questions come from current MAAO courses and IAAO 102. Items included are : units and elements of comparison; reconstructing an operating statement; calculation of potential gross income; effective gross income; net operating income; operating expense ratios; net operating income ratios; discount rates; recapture rates; overall capitalization rates; effective tax rates; sales ratios; statistical calculations such as mean, median, level of assessment statistics, coefficient of dispersion, coefficient of variation, price related differential, average absolute deviation; calculation of a debt coverage ratio; calculating a market condition (time) adjustment; use of a rent multiplier; sales comparison adjustment process; use of a cost manual; and the residual techniques used in the income approach. Current course materials will provide an excellent review. Section 2 has 10 short answer questions and Section 3 has 5 problem-solving questions.

Part 2 of the exam is in a narrative format. The candidate is provided detailed market, income and cost data to arrive at a value for an apartment property using the three approaches to value. The importance of this part is to DEMONSTRATE the candidate's knowledge of the appraisal process and to be able to extract data from the market information.

To successfully complete the exam a combined score of 75, or 75% of the maximum 100 points is required. The candidate has two opportunities to successfully complete the exam. If the second attempt is not successful, the candidate is required to write a demonstration narrative appraisal on an income producing property.

Minnesota Association of Assessing Officers
704 Broadway St
Alexandria, MN 56308

MAAO
Minnesota Association of Assessing Officers

MINNESOTA INCOME PROPERTY CASE STUDY EXAM
GRADING SUMMARY

Candidate's Name:	Date:
	License #:

Exam Date:	Grader:
Proctor:	

1st Grading ☐ 2nd Grading ☐

PART 1	**POSSIBLE POINTS**		**POINTS RECEIVED**
Multiple Choice	25		
Short Answer	10		
Problems	5		
Part 1 Possible Points	40	Part 1 Received	____

PART 2	**POSSIBLE POINTS**		**POINTS RECEIVED**
Cost Approach	15		
Income Approach	24		
Sales Comparison Approach	16		
Reconciliation	5		
Part 2 Possible Points	60	Part 2 Received	___

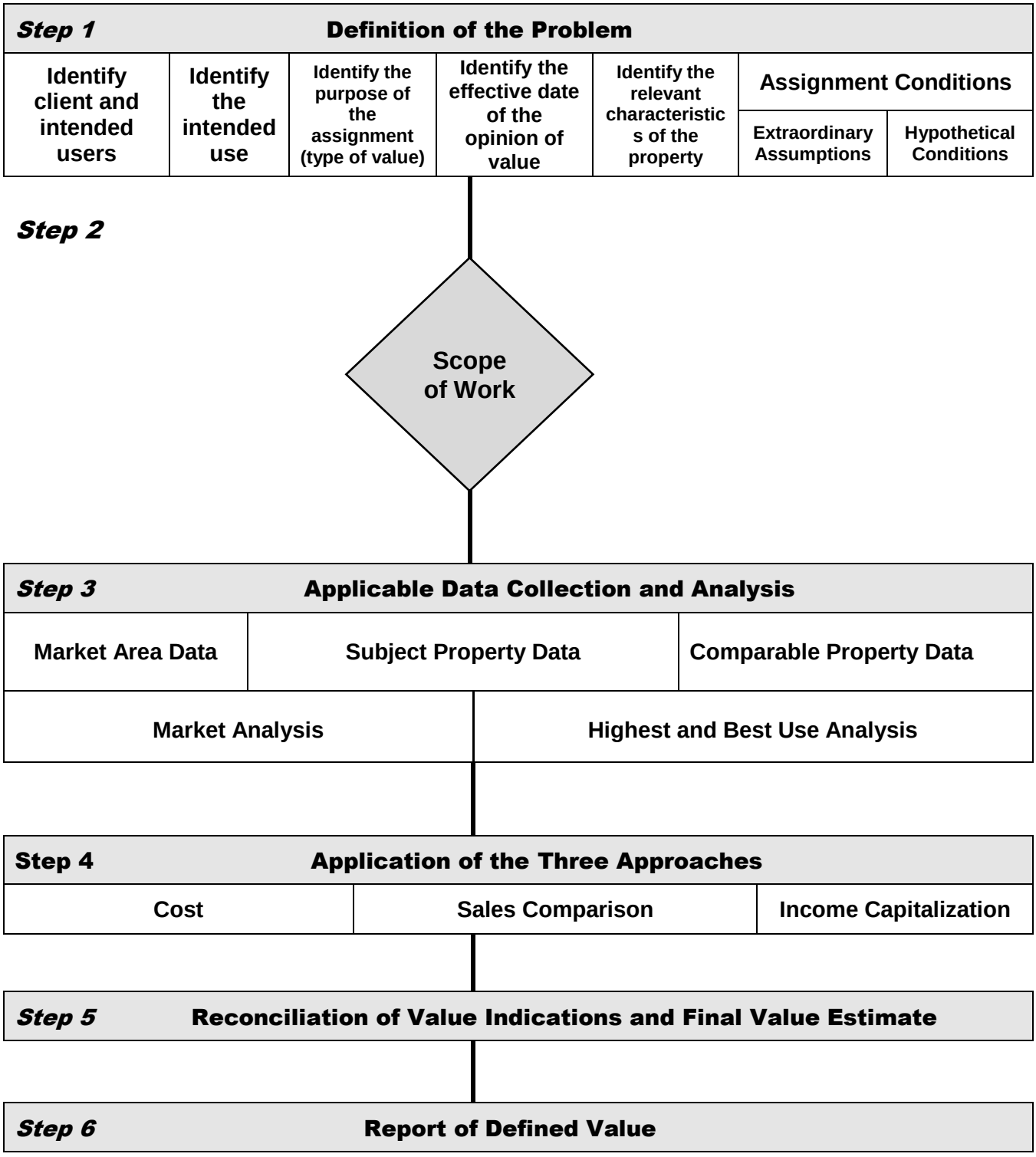
TOTAL POSSIBLE POINTS	100	Total Received	____

Minimum passing score is 75 or 75%.

Pass ☐ Fail ☐

_____
Grader's Signature Date

THE APPRAISAL PROCESS



DEFINITION OF MARKET VALUE

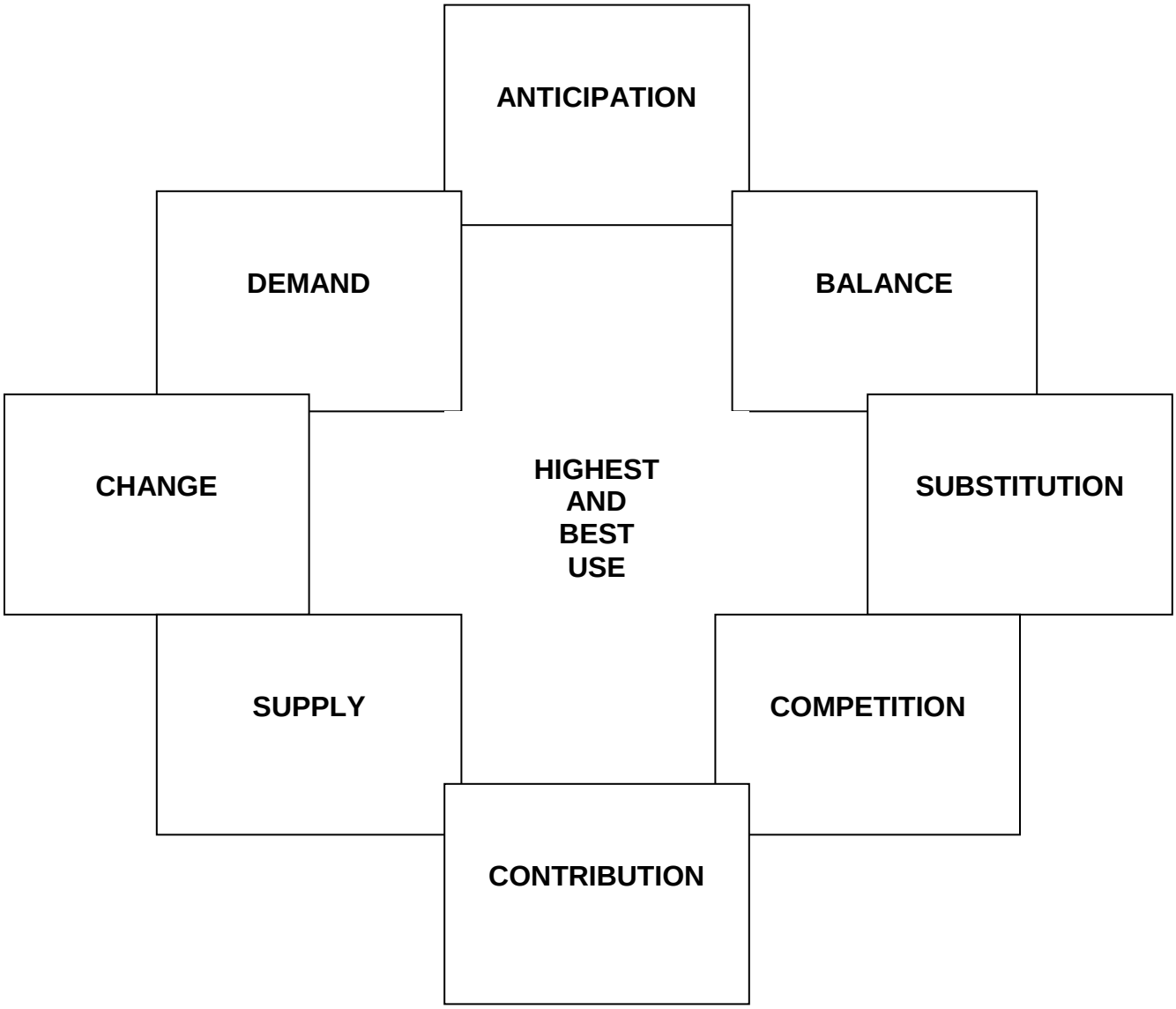
Most probable price that a property should bring

- In a competitive and open market;
- under conditions requisite to a fair sale;
- the buyer and seller each acting prudently and knowledgeably;
- assuming the price is not affected by undue stimulus.

Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

- buyer and seller are typically motivated;
- both parties are well-informed or well-advised, and acting in what they consider their best interests;
- a reasonable time is allowed for exposure in the open market;
- payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and
- the price presents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Market Value = Value in Exchange


ANTICIPATION
DEMAND
BALANCE
CHANGE
HIGHEST
AND
BEST
USE
SUBSTITUTION
SUPPLY
COMPETITION
CONTRIBUTION

COST APPROACH
Site Valuation

To estimate the value of the site, you have discovered the following site sales in the vicinity. Although they are different sizes, they all are zoned the same as the subject property and have public utilities available. The following is a summary of the site sales you will be using to value the subject site:

Sale #	**1**	**2**	**3**	**4**
Sale Date	10/5/2010	3/15/2011	1/31/2011	12/1/2011
Sale Price	$58,000	$150,000	$75,000	$57,000
Site Size	21,200 SF	48,000 SF	25,000 SF	20,000 SF
Units Buildable	9	24	12	8

- Market Conditions (Time) adjustment is 6% per year.
- Sale #3 is 5% inferior to subject.
- Sale #4 is 5% superior to subject.
- Date of appraisal is March 1, 2013.

Complete the site valuation grid on the following page.

COST APPROACH
Site Valuation

1. Based on the site sales provided, complete the following data/adjustment grid to list and analyze both the units of comparison and elements of comparison to estimate the site value.

	Subject	Sale #1	Sale #2	Sale #3	Sale #4
Sale Date					
Site Size					
Units Buildable					
Sale Price					
Market Conditions					
Adjusted Sale Price					
Adjustment					
Adjustment					
Final Adj. Sale Price					
Adjusted Price per ____					
Adjusted Price per ____					
# Adjustments					
Gross Adjustments					
Net Adjustments					

2. Explain your value estimate.

COST APPROACH
Site Valuation
SOLUTION PAGE

1. Based on the site sales provided, complete the following data/adjustment grid to list and analyze both the units of comparison and elements of comparison to estimate the site value.

	Subject	Sale #1	Sale #2	Sale #3	Sale #4
Sale Date		10/5/2010	3/15/20011	1/31/2011	12/1/2011
Site Size		21,200 Sq. Ft.	48,000 Sq. Ft.	25,000 Sq. Ft.	20,000 Sq. Ft.
Units Buildable		9 units	24 units	12 units	8 units
Sale Price		$58,000	$150,000	$75,000	$57,000
Market Conditions	.005/mo.	29 mo. 8,410	24 mo. 18,000	26 mo. 9,750	15 mo. 4,275
Adjusted Sale Price		66,410	168,000	84,750	61,275
Adjustment				4,238	-3,064
Adjustment					
Final Adj. Sale Price		$ 66,410	$ 168,000	$ 88,988	$ 58,211
Adjusted Price per sq.ft.	Range 22%	$3.13	$3.50	$3.56	$2.91
Adjusted Price per unit.	Range 6%	$7,379	$7,000	$7,416	$7,276
# Adjustments		1	1	2	2
Gross Adjustments		$8,410	$18,000	$13,988	$7,339
Net Adjustments		$8,410	$18,000	$13,988	$1,211

2. Explain your value estimate.

   Best unit of comparison is sale price per unit. Sales # 1 and # 4 had the least amount of gross adjustments. Site value would be somewhere between $7,276 and $7,379 per unit- buildable.

COST APPROACH

Improvement Valuation

Use of the Marshall Valuation Service in the Cost Approach

VALUE = Cost of Improvements – Depreciation + Land

The Calculator (Square Foot) Method is the primary method for evaluating common commercial properties

The Calculator Method provides square foot costs for various typical buildings, together with modifiers for common deviations from these typical buildings

The Calculator Method is based on the concept of cost per increment of floor area or volume (square foot, square meter or cubic foot). With this method, you select a cost from a table of typical costs that include material, labor, fees, overhead and profit. You then modify the cost for selected construction differences, design, size, time and location. The base tables and adjustments are organized by occupancy, class, size and quality.

When using the Marshall Valuation Service you must determine the following before making any calculations:

- Occupancy
- Construction Class
- Quality

MULTIPLE RESIDENCES
(Calculator Method)

CLASS OF CONSTRUCTION INDICATORS

CLASS	FRAME	FLOOR	ROOF	WALLS
A	Structural steel columns and beams, fireproofed with masonry, concrete, plaster, or other noncombustible material.	Concrete or concrete on steel deck, fireproofed.	Formed concrete, precast slabs, concrete or gypsum on steel deck, fireproofed.	Nonbearing curtain walls, masonry, concrete, metal and glass panels, stone, steel studs and masonry, tile or stucco, etc.
B	Reinforced concrete columns and beams. Fire-resistant construction.	Concrete or concrete on steel deck, fireproofed.	Formed concrete, precast slabs, concrete or gypsum on steel deck, fireproofed.	Nonbearing curtain walls, masonry, concrete, metal and glass panels, stone, steel studs and masonry, tile or stucco, etc.
C	Masonry or concrete load-bearing walls with or without pilasters. Masonry, concrete or curtain walls with full or partial open steel, wood, or concrete frame.	Wood or concrete plank on wood or steel floor joists, or concrete slab on grade.	Wood or steel joists with wood or steel deck. Concrete plank.	Brick, concrete block, or tile masonry, tilt-up, formed concrete, nonbearing curtain walls.
D	Wood or steel studs in bearing wall, full or partial open wood or steel frame, primarily combustible construction.	Wood or steel floor joists or concrete slab on grade.	Wood or steel joists with wood or steel deck.	Almost any material except bearing or curtain walls of solid masonry or concrete. Generally combustible construction.
S	Metal bents, columns, girders, purlins and girts without fireproofing, incombustible construction.	Wood or steel deck on steel floor joists, or concrete slab on grade.	Steel or wood deck on steel joists.	Metal skin or sandwich panels. Generally incombustible.

*AREA MULTIPLIERS - MULTIPLE RESIDENCES

TOTAL AREA (Square Feet)	Basement	4	6	8	10	12	NUMBER OF UNITS 16	20	25	30	35	40	50	60	80	100	TOTAL AREA (Square Meters)
4,000	1.076	.977	1.050	1.129	1.214	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	372
5,000	1.051	.947	1.004	1.063	1.127	1.194	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	465
6,000	1.031	.927	.973	1.021	1.072	1.125	1.239	-----	-----	-----	-----	-----	-----	-----	-----	-----	557
8,000	1.000	.903	.936	.971	1.007	1.044	1.123	1.207	-----	-----	-----	-----	-----	-----	-----	-----	743
10,000	.977	.888	.914	.941	.969	.998	1.057	1.121	1.205	-----	-----	-----	-----	-----	-----	-----	929
12,000	.958	-----	.899	.921	.944	.967	1.015	1.066	1.132	1.203	-----	-----	-----	-----	-----	-----	1,115
16,000	.930	-----	.879	.895	.912	.928	.963	.999	1.046	1.095	1.146	1.199	-----	-----	-----	-----	1,486
20,000	.908	-----	-----	.878	.891	.904	.931	.959	.995	1.032	1.071	1.111	1.196	-----	-----	-----	1,858
25,000	.887	-----	-----	-----	.874	.884	.906	.927	.955	.984	1.013	1.043	1.107	1.174	-----	-----	2,323
30,000	.870	-----	-----	-----	-----	.870	.887	.905	.928	.951	.975	.999	1.050	1.103	1.218	-----	2,787
40,000	-----	-----	-----	-----	-----	-----	.866	.879	.896	.912	.930	.947	.983	1.020	1.089	1.184	3,716
50,000	-----	-----	-----	-----	-----	-----	-----	.862	.875	.888	.902	.915	.943	.972	1.032	1.095	4,645
60,000	-----	-----	-----	-----	-----	-----	-----	-----	.860	.871	.882	.893	.916	.939	.987	1.038	5,574
80,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	.849	.857	.865	.882	.898	.933	.969	7,432
100,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	.846	.859	.872	.899	.927	.969	9,290

*For larger numbers of units, enter table with 100 units and 100 times average area per unit. See bottom of Page 14 for other refinement notes.

MULTIPLE RESIDENCES

(CALCULATOR METHOD)

CLASS	TYPE	EXTERIOR WALLS	INTERIOR FINISH	LIGHTING AND PLUMBING	HEAT	COST Sq. M.	COST Cu. Ft.	COST Sq. Ft.
C	Excellent	Face brick, concrete/metal panels, best roof structure and roofing	Good plaster and paint, paneling, fine detail, hardwood, carpet	Good fixtures, many outlets, central TV antenna, intercoms	Warm and cool air	$907.41	$9.37	$84.30
	Good	Good brick/stucco on block, good trim, roof structure and roofing	Good plaster or drywall, hardwood, carpet, vinyl composition	Good lighting, one bath per bedroom, TV antenna	Package A.C.	681.58	7.04	63.32
	Average	Brick or block, some trim, asphalt shingle or built-up roof	Plaster/drywall, paint, hardwood, carpet, vinyl composition	Adequate lighting/plumbing, phone and TV jacks	Forced air	509.14	5.26	47.30
	Fair	Block/brick, standard sash, little trim, shingle or built-up roof	Drywall or plaster, carpet, vinyl composition tile	Adequate standard lighting and plumbing per good codes	Electric baseboard	444.34	4.59	41.28
	Low cost	Low-cost brick or block, very plain, minimum fenestration	Painted block, drywall partitions, low-cost carpet or asphalt tile	Minimum lighting/plumbing per code	Wall furnace	379.86	3.92	35.29
D MASONRY VENEER	Excellent	Face brick, stone veneer, good wood or steel frame and roof structure	Good plaster, paint, paneling, fine detail, hardwood, carpet	Good fixtures, many outlets, central TV antenna, intercoms	Warm and cool air	892.44	9.21	82.91
	Good	Good brick veneer and fenestration, good roof structure and roofing	Good plaster and drywall, painted, hardwood, vinyl composition, carpet	Good lighting, one bath per bedroom, TV antenna	Package A.C.	667.37	6.89	62.00
	Average	Brick veneer, some ornamentation, average code construction	Plaster or drywall, hardwood, vinyl composition, carpet	Adequate lighting/plumbing, phone and TV jacks	Forced air	496.33	5.12	46.11
	Fair	Brick veneer, little trim, standard sash, asphalt shingle or built-up roof	Drywall or plaster, carpet, vinyl composition tile	Adequate standard lighting and plumbing per good codes	Electric baseboard	432.28	4.46	40.16
	Low cost	Low-cost brick, block veneer, very plain, minimum fenestration	Drywall and paint, asphalt tile and low-cost carpet	Minimum lighting/plumbing per code	Wall furnace	368.45	3.80	34.23
D	Excellent	Best stucco or siding, brick and stone trim, heavy basic structure	Good plaster, paint, paneling, fine detail, hardwood, carpet	Good fixtures, many outlets, central TV antenna, intercoms	Warm and cool air	874.14	9.02	81.21
	Good	Good stucco or siding, some brick or stone trim, good roof	Good plaster or drywall, painted, hardwood, vinyl composition, carpet	Good lighting, one bath per bedroom, TV antenna	Package A.C.	651.65	6.73	60.54
	Average	Stucco/siding, some ornamentation, average code construction	Plaster or drywall, hardwood, vinyl composition, carpet	Adequate lighting/plumbing, phone and TV jacks	Forced air	482.77	4.98	44.85
	Fair	Stucco or siding, standard sash, asphalt shingles/built-up roof	Drywall or plaster, carpet, vinyl composition tile	Adequate standard lighting and plumbing per good codes	Electric baseboard	419.69	4.33	38.99
	Low cost	Low-cost stucco or siding, very plain, minimum fenestration	Drywall and paint, asphalt tile and low-cost carpet	Minimum lighting/plumbing per code	Wall furnace	356.93	3.68	33.16
S	Good	Good sandwich panels on pre-engineered frame, good fenestration	Gypsum board and plastics, carpet and vinyl composition	Good lighting, one bath per bedroom, TV antenna	Package A.C.	645.19	6.66	59.94
	Average	Sandwich panels, pre-engineered frame, adequate fenestration	Gypsum board, vinyl composition, carpet	Adequate lighting/plumbing, phone and TV jacks	Forced air	479.21	4.95	44.52

DEPRECIATION CALCULATION

Analyze the following 3 sales to extract the subject's annual depreciation and total economic life from the market.

	Sale #1	***Sale #2***	***Sale #3***
Sale Price	$800,000	$700,000	$600,000
Site Value	(150,000)	(140,000)	(120,000)
Improvement Value			
RCN (Improvements)	820,000	725,000	615,000
Indicated Value of Improvements			
Accrued Depreciation			
Percent Depreciation	%	%	%
Indicated Effective Age	20	20	20
Percent Annual Depreciation	%	%	%
Estimated Total Economic Life (Years)			

DEPRECIATION CALCULATION

SOLUTION

Analyze the following 3 sales to extract the subject's annual depreciation and total economic life from the market.

	Sale #1	***Sale #2***	***Sale #3***
Sale Price	$800,000	$700,000	$600,000
Site Value	(150,000)	(140,000)	(120,000)
Improvement Value	650,000	560,000	480,000
RCN (Improvements)	820,000	725,000	615,000
Indicated Value of Improvements	650,000	560,000	480,000
Accrued Depreciation	$170,000	$165,000	$135,000
Percent Depreciation	170,000 ÷ 820,000 20.7%	165,000 ÷ 725,000 22.8%	135,000 ÷ 615,000 22.0%
Indicated Effective Age	20	20	20
Percent Annual Depreciation	(.207 ÷ 20) x 100 1.04%	(.228 ÷ 20) x 100 1.14%	(.220 ÷ 20) x 100 1.10%
Estimated Total Economic Life (Years)	1 ÷ .0104 96	1 ÷ .0114 88	1 ÷ .0110 91

COST APPROACH
Improvement Valuation

SUBJECT PROPERTY

8 unit apartment building
2-story built in 1962
Average unit size is 956 sf.
Wood frame construction
Physical Condition is average
Brick exterior
Hip roof with composition shingles
Hot water heat
Construction Quality is good
Gross building area is 9,000 square feet

-

COST APPROACH
Replacement Cost New

From the cost information included on pages 8-9, estimate the replacement cost new (RCN) of the subject improvements.

Occupancy-Multiple Residences

Building Class and Quality-_____

Gross Building Area-_____

Cost per Sq. Ft.-_____

Area Multiplier-_____

Modified Cost per Sq. Ft.-_____

RCN =_____

From the Depreciation Calculation on page 10, calculate the depreciation for the subject property.

COST APPROACH
Replacement Cost New
SOLUTION PAGE

From the cost information included on pages 8-9, estimate the replacement cost new (RCN) of the subject improvements.

Occupancy-Multiple Residences

Building Class and Quality-Class “D” Masonry Veneer, Quality “Good”

Gross Building Area- 9,000 square feet

Cost per Sq. Ft.- $62.00 per sq. ft.

Area Multiplier- Subject is 8 units, 9,000 sq. ft. so…

8,000 sq. ft. multiplier is .**971**; 10,000 sq. ft. multiplier is **.941**

Interpolation for 9,000 sq. ft. = (.971 + .941) / 2 = .956

Modified Cost per Sq. Ft.-$62.00 x .956= $59.27

RCN = $59.27 x 9,000 sq. ft. = $533,430

From the Depreciation Calculation on page 10, calculate the depreciation for the subject property.

.011 (percent annual depreciation) x 20 years (effective age) = .220 or 22.0%

SAMPLE COMPARABLE #1

Front View

Property Address: 400 9 AV N		Name:	Stellar Apartments
PIN: 82.45000.000		Year Built:	1980
Condition:	Ave	# Units:	8 # BR 16 # Rooms 32
Gross Floor Area:	7,000	Net Leasable Area:	6,400
Apt. Rent per Unit	$600	Garage Rent # Units	4 @$ Per month 40
Gross Sale Price	$310,000	Personal Property	$6,000
Sale Price per Unit	$38,750	Sale Date:	6/15/2012
Actual Rents Collected	$56,300	Actual Expenses	$27,100 (including taxes and reserves)
Payable 2013 Taxes	$4,100	Assessor's 2012 EMV	$276,000
Site Size:	16,000 SF	Zoning:	R-5

NOTES:

Terms: 25% Down; Mortgage @ 6.25%; Monthly Pmt. $1,431.54

Using Sample Comparable #1 on page 15, calculate the following information:

1. Net Sale Price_____
2. Net Sale Price per Gross Floor Area_____
3. Net Sale price per Unit_____
4. Net Sale Price per Bedroom_____
5. Net Sale price per Room_____
6. Net Sale Price per Net Leasable Area_____
7. Personal Property per Unit_____
8. Potential Gross Income_____
9. Vacancy and Collection Loss_____
10. Effective Gross income_____
11. Operating Expense _____
12. Operating Expense Ratio (excluding taxes) _____
13. Net Operating Income_____
14. Net Operating Income Ratio_____
15. Effective Tax Rate_____
16. Potential Gross Income Multiplier_____
17. Effective Gross Income Multiplier_____
18. Overall Capitalization Rate_____
19. Loan-to -Value Ratio_____
20. Mortgage Amount_____
21. Annual Debt Service_____
22. Mortgage Constant_____
23. Debt Coverage Ratio_____

Solutions:

1. Net Sale Price **= $304,000** (sale price-PP)
2. Net Sale Price per Gross Floor Area **= $43.43**
3. Net Sale price per Unit = **$38,000**
4. Net Sale Price per Bedroom = **$19,000**
5. Net Sale price per Room = **$9,500**
6. Net Sale Price per Net Leasable Area = **$47.50**
7. Personal Property per Unit = **$750**
8. Potential Gross Income = **$59,520** ($600 x 8 x 12) + ($40 x 4 x 12)
   * garage rent is included in Potential Gross Income
9. Vacancy and Collection Loss = **$3,220** or **5.41%** ($59,520 - $56,300) ÷ $59,520
10. Effective Gross income = **$56,300** (aka "actual rents collected')
11. Operating Expense = **$27,100**
12. Operating Expense Ratio (excluding taxes) = **0.41** or **41%** ($23,000 ÷ $56,300)
13. Net Operating Income = **$29,200** ($56,300 - $27,100)
14. Net Operating Income Ratio = **.52** or **52%**
15. Effective Tax Rate = **.0149** or **1.49%** ($4,100 ÷ $276,000)
    * ETR is calculated as a percent of assessor's EMV
16. Potential Gross income Multiplier = **5.21** use V / I F ($310,000 ÷ $59,520)
    * PGIM is calculated using Gross Sale Price
17. Effective Gross Income Multiplier = **5.51** ($310,000 ÷ $56,300)
    *EGIM is calculated using Gross Sales Price

Solutions:

18. Overall Capitalization Rate = **9.42%** use $\frac{I}{R\ V}$ ($29,200 ÷ $310,000)
    *NOI includes real estate taxes as an expense

19. Loan-to -Value Ratio = **.75** (25% down = 75% mortgage)

20. Mortgage Amount = **$232,500** ($310,000 x .75)

21. Annual Debt Service = **$17,178.48** ($1,431.54 x 12)

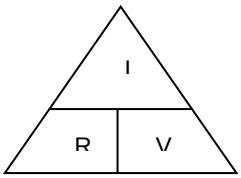
22. Mortgage Constant = **7.39** ($17,178.48 ÷ $232,500)
    *Mortgage Constant used in Band of Investment and DCR methods

23. Debt Coverage Ratio = **1.70** ($29,200 ÷ $17,178.48)

DIRECT CAPITALIZATION

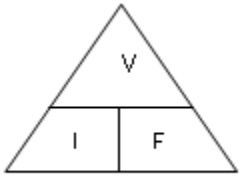
TWO TYPES

IRV



- Normal net income from a single year is divided by an overall capitalization rate to produce an estimate of value
- The overall capitalization rate is developed from an analysis of actual ratios of income to sale price of properties similar to the one being appraised

VIF



- Used when data on operating expenses are unavailable
- Gross income from a single period is multiplied by a factor to produce an estimate of value
- Factors include: *GIM, GRM, PGIM, EGIM*

Reconstruction of an Operating Statement

You are appraising an 12-unit 2 BR apartment property for tax purposes. Shown below is the owner's operating statement prepared by his accountant. After careful analysis, you decide that all items are reasonably correct, needing only to be rounded to the nearest $10. The owner did not include in his statement an allowance for vacancies, which you estimate to be 3 percent of gross income. He did not include any reserves for replacement, which you estimate to be $4,500. Painting and decorating are included in the reserves. Reconstruct the operating statement, to estimate the net operating income.

	Owner's Figures	Your Estimate
Gross Income	$86,400.00	_____
Allowance for vacancies	---	_____
Effective gross income	$86,400.00	_____
Expenses:		
Employees' salaries and wages	7,300.59	_____
Employees' benefits	400.11	_____
Insurance	1,595.72	_____
Gas	2,690.72	_____
Painting and decorating	2,186.85	_____
Payments on air conditioners	3,000.00	_____
Repairs	1,560.00	_____
Supplies	399.14	_____
Electricity	1,275.19	_____
Water	488.60	_____
Reserves for replacements	---	_____
Management	4,200.00	_____
Real estate taxes	14,400.00	_____
Depreciation-building	10,416.00	_____
Interest on mortgage	16,000.00	_____
Legal and accounting fees	300.00	_____
Principal on mortgage	2,800.00	_____
Miscellaneous expenses	1,500.00	_____
TOTAL EXPENSES	$70,512.92	$_____
NET INCOME	$19,487.08	$_____

Reconstruction of an Operating Statement

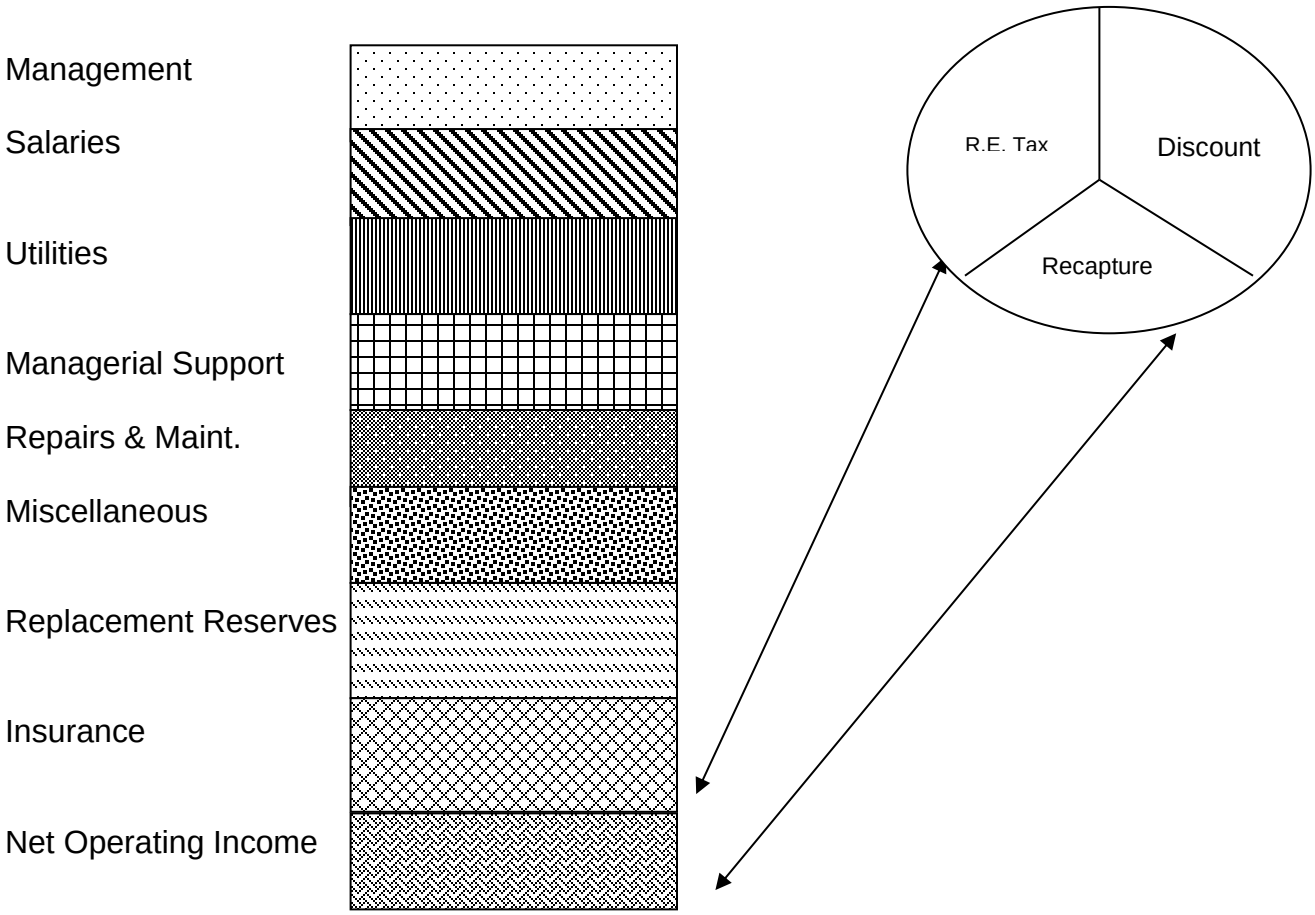
SOLUTION

	Owner's Figures	Your Estimate
Gross Income	$86,400.00	$86,400.00
Allowance for vacancies		$2,592.00
Effective Gross Income	$86,400.00	$83,808.00
Expenses:		
Employees' salaries and wages	$7,300.59	$7,300.00
Employees benefits	$400.11	$400.00
Insurance	$1,595.72	$1,600.00
Gas	$2,690.72	$2,690.00
Painting and decorating	$2,186.85	$0.00
Payments on air conditioners	$3,000.00	$0.00
Repairs	$1,560.00	$1,560.00
Supplies	$399.14	$400.00
Electricity	$1,275.19	$1,280.00
Water	$488.60	$490.00
Reserves for replacements	$0.00	$4,500.00
Management	$4,200.00	$4,200.00
Real estate taxes	$14,400.00	* $0.00
Depreciation-building	$10,416.00	$0.00
Interest on mortgage	$16,000.00	$0.00
Legal and accounting fees	$300.00	$300.00
Principal on mortgage	$2,800.00	$0.00
Miscellaneous expenses	$1,500.00	$1,500.00
TOTAL EXPENSES	$70,512.92	$26,220.00
NET INCOME	$15,887.08	$57,588.00

* real estate taxes are accounted for by including an effective tax rate in the overall capitalization rate

Income Statement Components
Expense Categories & Breakdown of NOI

Effective Gross Income



Expense Categories

Direct Capitalization with a Capitalization Rate

Using the net operating income from the prior exercise on page 21 and the market data derived from sample Comparable Sale #1 on page 15, estimate the value of the 12-unit apartment by the income approach.

Capitalization Process:

NET OPERATING INCOME _____

CAPITALIZATION

OVERALL RATE _____

EFFECTIVE TAX RATE _____

Built-Up Rate _____

Capitalized Value _____

Less Personal Property _____ per unit (_____)

Indicated Value _____

Indicated Value Per Unit _____

SOLUTION

Direct Capitalization with a Capitalization Rate

Using the net operating income from the prior exercise on page 21 and the market data derived from sample Comparable Sale #1 on page 15, estimate the value of the 12-unit apartment by the income approach.

Capitalization Process:

NET OPERATING INCOME	$57,588

CAPITALIZATION

OVERALL RATE	.0942
EFFECTIVE TAX RATE	.0149
Built-Up Rate	**.1091**

Capitalized Value		$527,846
Less Personal Property	$750 per unit (x 12 units)	($9,000)
Indicated Value		$518,800
Indicated Value Per Unit		$43,233

INCOME APPROACH
IMPORTANT POINTS TO REMEMBER

- Capitalization rates that are derived from market sales **should include real estate taxes as an expense** when calculating net operating income (NOI)

  Comparable #1

  Gross Sale Price - $400,000
  Actual Rents Collected - $60,000
  Actual Expenses - $29,000 (including taxes)
  Net Operating Income - $31,000
  Cap Rate = $31,000 / $400,000 =.0775 or 7.75%

- When calculating NOI for the subject property, **real estate taxes are excluded and instead, the effective tax rate (ETR) is added to the market derived cap rate** to arrive at a "built-up rate"

  Subject Property

  NOI (not including real estate taxes) - $35,000
  Indicated Cap Rate - .0775
  Effective Tax Rate - .014
  Built-Up Rate - .0915

  Capitalized Value = $35,000 / .0915 = $382,500

- Personal property is deducted from the capitalized value to arrive at an indicated value for the real property only

  Capitalized Value = $382,500
  Less Personal Property
  $500 x 12 units = ($6,000)

  Indicated Value = $376,500

SALES COMPARISON APPROACH
MARKET CONDITIONS (TIME) ADJUSTMENT CALCULATION FOR IMPROVED PROPERTIES

To estimate an appropriate market conditions adjustment, analyze three apartment properties that have sold twice within the last three years.

Property #1	Sale Date 07/14/2011	Sale Price $395,000
	Sale Date 12/20/2012	Sale Price $420,000
Property #2	Sale Date 11/02/2011	Sale Price $700,000
	Sale Date 02/05/2013	Sale Price $740,000
Property #3	Sale Date 01/30/2011	Sale Price $220,000
	Sale Date 01/25/2013	Sale Price $240,000

From this market data, estimate the appropriate market conditions adjustment for the improved comparables.

SALES COMPARISON APPROACH
MARKET CONDITIONS (TIME) ADJUSTMENT CALCULATION FOR IMPROVED PROPERTIES

SOLUTION

To estimate an appropriate market conditions adjustment, analyze three apartment properties that have sold twice within the last three years.

Property #1 Sale Date 07/14/2011 Sale Price $395,000
Sale Date 12/20/2012 Sale Price $420,000

Property #2 Sale Date 11/02/2011 Sale Price $700,000
Sale Date 02/05/2013 Sale Price $740,000

Property #3 Sale Date 01/30/2011 Sale Price $220,000
Sale Date 01/25/2013 Sale Price $240,000

From this market data, estimate the appropriate time adjustment for the improved comparables.

Property #1:

$420,000
- 395,000

25,000 / 395,000 = 0.0633 / 17 months
= .0037 monthly * 12 = .045 annually

Property #2:

$ 740,000
- 700,000

40,000 / $700,000 = 0.0571 / 15 months
= .0038 monthly * 12 = .046 annually

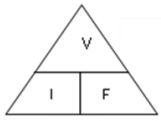
Property #3:

$240,000
- 220,000

20,000/ $220,000 = .091 / 24 months
= .0038 monthly * 12 = .045 annually

Application of the Potential Gross Income Multiplier

Using the potential gross income from the reconstructed operating statement on page 21 and the market data derived from sample Comparable Sale #1 on page 15, estimate the value of the 12-unit apartment using the Potential Gross Income Multiplier (PGIM).



POTENTIAL GROSS INCOME _____

POTENTIAL GROSS INCOME MULTIPLIER _____

Estimated Value _____

Less Personal Property _____ per unit (_____)

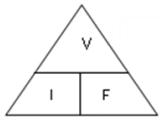
Indicated Value _____

Indicated Value Per Unit _____

SOLUTION

Application of the Potential Gross Income Multiplier

Using the potential gross income from the reconstructed operating statement on page 21 and the market data derived from sample Comparable Sale #1 on page 15, estimate the value of the 12-unit apartment using the Potential Gross Income Multiplier (PGIM).



POTENTIAL GROSS INCOME **$86,400**

POTENTIAL GROSS INCOME MULTIPLIER **5.21**

I x F = V

(86,400 x 5.21)

Estimated Value		$450,144
Less Personal Property	$750 per unit (x 12 units)	($9,000)
Indicated Value		$441,100
Indicated Value Per Unit		$36,750

Table 13.2 Techniques Used in Quantitative and Qualitative Analysis

Quantitative Analysis	Qualitative Analysis
· Paired data analysis (sales and resales of the same or similar properties)	· Trend analysis
· Grouped data analysis	· Relative comparison analysis
· Secondary data analysis	· Ranking analysis
· Statistical analysis including graphic analysis and scenario analysis*	
· Cost-related adjustments (cost-to-cure, depreciated cost)	
· Capitalization of income differences	

* Note that forms of statistical analysis can also serve as qualitative techniques.

comparison. Often the "transactional" adjustments–property rights conveyed, financing, conditions of sale (motivation), expenditures made immediately after purchase, and date of sale (market conditions)–are made to the total sale price. The adjusted price is then converted into a unit price and adjusted for the "property"-related elements of comparison such as physical and legal characteristics.

Elements of Comparison

Elements of comparison are the characteristics of properties and transactions that help explain the variances in the prices paid for real property. The appraiser determines the elements of comparison for a given appraisal through market research and supports those conclusions with market evidence. When properly identified, the elements of comparison describe the factors that are associated with the prices paid for competing properties. The market data, if analyzed properly, will identify the elements of comparison within the comparable sales that are market-sensitive.

The basic elements of comparison that should be considered in sales comparison analysis are as follows:

1. Real property rights conveyed
2. Financing terms (i.e., cash equivalency)
3. Conditions of sale (i.e., motivation)
4. Expenditures made immediately after purchase
5. Market conditions (i.e., time)
6. Location
7. Physical characteristics (e.g., size, soils, access, construction quality, condition)
8. Economic characteristics (e.g., expense ratios, lease provisions, management, tenant mix)
9. Use (e.g., zoning, water and riparian rights, environmental, building codes, flood zones)
10. Non-realty components of value (e.g., business value, chattel, franchises, trademarks)

elements of comparison
The characteristics or attributes of properties and transactions that cause the prices of real estate to vary; include real property rights conveyed, financing terms, conditions of sale, expenditures made immediately after purchase, market conditions, location, physical characteristics, other characteristics such as economic characteristics, use, and non-realty components of value. Elements of comparison are analogous to the lines of adjustment shown on a sales comparison adjustment grid.

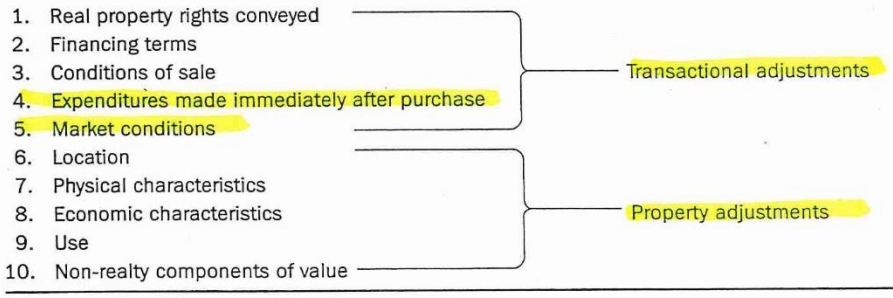
In most cases the elements of comparison cover all the significant factors to be considered, but on occasion additional factors may be relevant. Other possible elements of comparison include governmental restrictions such as conservation or preservation easements and off-site improvements required for the development of a vacant site.

Often a basic element of comparison is broken down into subcategories that specifically address the property factor being analyzed. For example, physical characteristics may be broken down into subcategories for age, condition, size, and so on. (Adjustment techniques for each of the standard elements of comparison are illustrated in Chapter 14.) There is no limit to the number of elements of comparison that may be found in a market, so it is important to remember that another line can always be added to an adjustment grid for an additional item recognized in the market. For example, an appraiser may need to add "roof color" as an element of comparison if the market makes distinctions in sale price based on the color of the roof. However, note that adding elements of comparison for adjustment may lead to multiple adjustments for the same factor, a common error that is discussed in Chapter 14.

Sequence of Adjustments

The sequence in which adjustments are applied to the comparable sales is determined by the market data and the appraiser's analysis of that data. The first five elements of comparison in the list are considered "transactional" adjustments, while the latter five are considered "property" adjustments (see Figure 13.1). The transactional adjustments are generally applied in the order listed. The property adjustments are usually applied after the transactional adjustments, but in no particular order.

Figure 13.1 Transactional and Property Adjustments



The sequence can vary depending on the availability and reliability of sales information. For example, resales supporting a market conditions adjustment may then allow a pairing of data to extract a financing terms adjustment. The sequence presented in Table 13.3 is provided for purposes of illustration. This sequence is often applicable when percentage adjustments are calculated and added, either in conjunction with other percentage adjustments or in combination with dollar adjustments.

The sequence of adjustments shown in Figure 13.1 is not the only order in which quantitative adjustments can be made. Adjustments may be applied in other sequences if the market and the appraiser's analysis of the data so indicate. Using the adjustment sequence, the appraiser applies successive adjustments to the prices of comparable properties.

Most property types other than one-unit residences are adjusted on a unit price basis. Property adjustments for location, physical characteristics, economic characteristics, use, and non-realty components are typically applied to a unit price.

Table 13.3 Sequence of Adjustments

Element of Comparison	Market-Derived Adjustment	Adjustment Applied to Sale Price of Comparable Property
Sale price*		$400,000
Transactional adjustments		
Adjustment for property rights conveyed	+ 5%	+ 20,000
Adjusted price		$420,000
Adjustment for financing terms	− 2%	− 8,400
Adjusted price		$411,600
Adjustment for conditions of sale†	+ 5%	+ 20,580
Adjusted price		$432,180
Adjustment for expenditures immediately after purchase	+ $20,000	+ $20,000
Adjusted price		$452,180
Adjustment for market conditions	+ 5%	+ 22,609
Adjusted price		$474,789
Property adjustments		
Adjustment for		
Location	+ 3%	+ 14,244
Physical characteristics	− 5%	− 23,739
Economic characteristics	− 5%	− 23,739
Use	+ 2%	+ 9,496
Non-realty components	+ 3%	+ 14,244
Indication of value		$465,295

* In the market data grid, the sale price could be converted into a unit price, such as price per square foot of leaseable area, and adjustments made to the unit price rather than the sale price.

† The effect of the conditions of sale on the adjusted sale price may already be reflected in the adjustment for financing terms, depending on how the adjustments are extracted from the market.

Interviewing the participants involved in the transaction may provide an indication of the magnitude of the adjustment, but sometimes the direction of an adjustment for conditions of sale may be all that can be determined. In the case of a distressed seller, an upward adjustment would probably be necessary to reflect the value the seller is not recapturing by accepting an expedient offer. The direction of a conditions of sale adjustment in transactions involving related parties may be more difficult to determine. Parents may accept a below-market price for a property to help their children pay for their first home, which would necessitate an upward adjustment if that sale were used as a comparable sale. Or younger members of a family may offer to purchase a property belonging to an older relative at a price higher than the market level so that they can keep the property in the family, which would suggest a downward adjustment is necessary. If the details of the transaction are too difficult to verify, an adjustment for conditions of sale may not be usable.

Expenditures Made Immediately After Purchase

A knowledgeable buyer considers expenditures that will have to be made upon purchase of a property because these costs affect the price the buyer agrees to pay. Such expenditures may include

- Costs to cure deferred maintenance
- Costs to demolish and remove any portion of the improvements
- Costs to petition for a zoning change
- Costs to remediate environmental contamination

These costs are often quantified in price negotiations and can be discovered through verification of transaction data. The relevant figure is not the actual cost that was incurred but the cost that was anticipated by both the buyer and seller.

Generally an adjustment for expenditures made immediately after purchase is simple to quantify when transaction data is being verified with the market participants. For example, consider a 150,000-sq.-ft. warehouse that is comparable to the property being appraised and was recently sold for $850,000. The new owner-occupant expected to spend $65,000 to install an additional door and loading dock, which was a market-driven decision. In an interview with the new owner of the comparable property, the appraiser learns that the demolition and new construction actually cost $105,000. The value indication for that comparable property would be $915,000 ($850,000 + $65,000) rather than $955,000 ($850,000 + $105,000) because the $65,000 expenditure anticipated by the buyer was deducted from the price the property would command in the market if no expenditures were necessary. If the actual cost of the renovation had been $40,000, the buyer would have enjoyed a $25,000 savings ($65,000 – $40,000) from the expected cost, but those savings would not be reflected in the price the buyer was willing to pay, which is already an established fact.

Adjustments for deferred maintenance can be handled similarly, but the appraiser should make sure that the buyer and seller were aware of any items needing immediate repair. If the seller was not required to disclose that the roof of the warehouse had a leak and needed repairs, the buyer may not have anticipated those expenditures after the purchase, and there would be no adjustment to the recorded sale price for that item of deferred maintenance. Other items that a buyer may need to budget expenses immediately after purchase for include

- Cost of obtaining entitlements
- Demolition and removal costs
- Environmental remediation costs
- Large capital improvements needed at the time of sale

In sales comparison analysis, costs incurred by the new owners of comparable properties are reflected as positive adjustments to the sale prices of those properties. If the subject property requires some expenditure immediately after the purchase to reach its full utility, the adjustment amount is subtracted from the sale prices of all comparable sales that do not require a similar expenditure to adjust those transactions for differences from the subject property.

An adjustment for expenditures made immediately after purchase is distinct from an adjustment for the physical condition of a property. The expenditures adjustment is included among the transactional adjustments because it reflects those items that a buyer would have considered part of the price at the time of the sale. For example, a buyer bought a property that included a 6.75-acre site improved with a 122,000-sq.-ft. industrial building with many environmental problems. The buyer told the appraiser the cost of removing the environmental problems was $750,000. The sale price of the property was only $225,000. The appraiser is considering using this as a comparable land sale, but the buyer actually has $975,000 ($750,000 + $225,000) invested in the property, not just the $225,000 sale price. In the sequence of adjustments, an adjustment for expenditures made immediately after purchase is shown above the market conditions line, which means the market conditions adjustment would be made on the $975,000 price, not the $225,000 price.

Another application of this adjustment is for items that would affect the sale price but not necessarily the rental income. For example, the subject property is a 55,000-sq.-ft., three-story office building that has a new roof covering and three new HVAC units. The cost of these items is $252,000. A nearly identical property just sold for $5 million, but this property needed a new roof covering and three new HVAC units. The rental rates of both buildings are the same, but the maintenance expense for the comparable property is much higher. The adjustment for the deferred maintenance items found in the comparable property could be made on the condition line of an adjustment grid or on the expenditures made immediately after purchase line. An adjustment made on the condition line would affect the capitalization rate that might be extracted from this sale.

SALES COMPARISON APPROACH

Examples of elements of comparison:

- Unit mix
- Effective age
- Condition
- Location
- Quality
- Garages

Examples of units of comparison:

- Per Unit
- Per Room
- Per Bedroom
- Per Square Foot (GFA)
- Per Square Foot (NLA)

CAPITALIZATION OF RENT DIFFERENCES TO DERIVE ADJUSTMENTS FOR USE IN THE SALES COMPARISON APPROACH

Paired data analysis which relies on rent differences can be utilized to derive adjustments in the Sales Comparison Approach. This is accomplished using the VIF formula:

$$\frac{V}{I\ F} \qquad V = I \times F$$

The first step is to derive a Potential Gross Income Multiplier (PGIM) for the subject property from comparable sales. This will be the factor or multiplier that is utilized.

The second step is to identify two properties that are similar except for the element of comparison requiring an adjustment. The rent difference is then capitalized into an indication of value.

For example, there are two apartment properties that are similar except that one has recently been remodeled and the other has not. The property with the remodeled units has rents of $650 per month and the property that has not been updated has rents of $620 per month. Your market analysis indicates that PGIMs for similar properties are 6.0. What is the indicated difference in value?

I = $650 - $620 = $30 x 12 (months) = $360 (annualized rent diff.) F = 6.0 (PGIM)

So $360 x 6.0 = $2,160 per unit

SALES COMPARISON APPROACH

The following grid presents information on five sales that are considered comparable to the subject property:

	Subject	Sale #1	Sale #2	Sale #3	Sale #4	Sale #5
Sale Date		2 mo. ago	4 mo. ago	5 mo.ago	1 mo. ago	9 mo. ago
Gross Sales Price		$541,400	$653,100	$640,500	$442,600	$638,500
Personal Property		$500/unit	$500/unit	$500/unit	$500/unit	$500/unit
Total Units	12	10	12	12	8	12
Unit Mix	2 BR	2 BR	2BR	2BR	2BR	2BR
Location	Ave	Fair	Ave	Fair	Ave	Ave
Condition	Good	Good	Good	Good	Good	Good
Number of Baths/Unit	1	2	1	1	1	2
Rent/Unit		$490	$500	$475	$500	$515

Using a Potential Gross Multiplier (PGIM) of 6.0 and a Market Conditions annual adjustment of 6.0%, complete the following adjustment grid and derive a value indication for the subject property.

The following elements of comparison require adjustments:

Location:

Baths:

SALES COMPARISON APPROACH

PROBLEM

Gross Sales Price						
Net Sales Price						
Mkt. Conditions						
Adjusted Sale Price						
Location Adjustment						
Bath Adjustment						
Adjusted Sale Price						
ASP per _____						
# of Adjustments						
Gross Adjustments						
Net Adjustments						

SOLUTION

	Subject	Sale #1	Sale #2	Sale #3	Sale #4	Sale #5
Sale Date		2 mo. ago	4 mo. ago	5 mo. ago	1 mo. ago	9 mo. ago
Gross Sales Price		$541,400	$653,100	$640,500	$442,600	$638,500
Net Sales Price	**-$500/unit**	$536,400	$647,100	$634,500	$438,600	632,500
Mkt. Conditions	**+.005/mo.**	+5,364	+12,942	+15,862	+2,193	+28,462
Adjusted Sale Price		$541,764	$660,042	$650,362	$440,793	660,962
Location Adjustment		+18.000		+21,600		
Bath Adjustment		-10,800				-12,960
Adjusted Sale Price		$549,000	$660,000	$672,000	$440,800	$648,000
ASP per unit		$54,900	$55,000	$56,000	$55,100	$54,000
# of Adjustments		3	1	2	1	2
Gross Adjustments		$34,164	$12,942	$37,462	$2,193	$41,422
Net Adjustments		$12,564	$12,942	$37,462	$2,193	$15,502

Location:

Sale # 1 & Sale # 5 $515 - $490 = $25 per month
or
Sale # 2 & Sale # 3 $500 - $475 = $25 per month

($25 x 12) x 6.0 = $1,800 per unit

Sale #1 adjustment (Fair vs. Ave. Location) = $1,800 x 10 units = +$18,000
Sale # 3 adjustment (Fair vs. Ave. Location) = $1,800 x 12 units = +$21,600

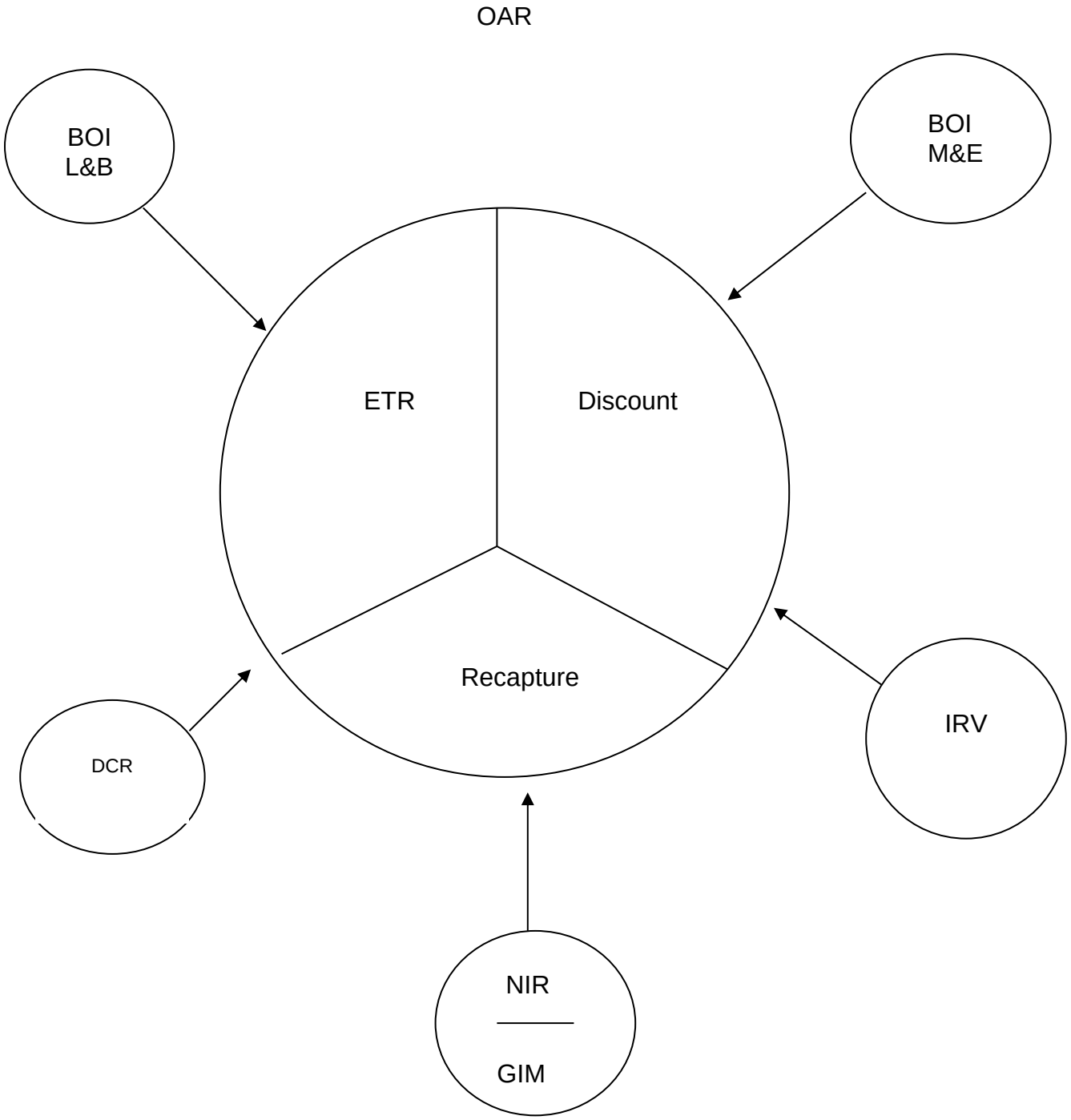
Baths:

Sale #2 & Sale # 5 $515-$500 = $15 per month
or
Sale #4 & Sale #5 $515-$500 = $15 per month

($15 x 12) x 6.0 = $1,080 per unit

Sale #1 adjustment (1 vs. 2 baths) = $1,080 x 10 units = -$10,800
Sale #5 adjustment (1 vs. 2 baths) = $1,080 x 12 units = -$12,960

DIRECT CAPITALIZATION METHODS OF ESTIMATING THE OVERALL RATE (OAR)



DEVELOPMENT OF OVERALL RATE BAND-OF-INVESTMENT METHOD
(Weighted Average of Debt and Equity Rates)

Financial Components	Percent of Investment		Rate		Product
Debt	0.80	X	0.109044[1]	=	0.087235
Equity	0.20	X	0.14000	=	0.028000
Totals	1.00	Overall Rate (R_O)		=	0.115235

[1] The debt annual constant of 0.109044 is the ratio of the total mortgage payments for the year divided by the amount of money borrowed.

Problem

Calculate an overall capitalization rate by the band of investment method using the information from Sample Comparable #1 on pages 15-17. Your research indicates that Investors are requiring a 13% return on these types of properties.

DEVELOPMENT OF OVERALL RATE BAND-OF-INVESTMENT METHOD
(Weighted Average of Debt and Equity Rates)

Financial Components	Percent of Investment		Rate		Product
Debt	0.80	X	0.109044[1]	=	0.087235
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Totals	1.00	Overall Rate (R_O)		=	0.115235

[1] The debt annual constant of 0.109044 is the ratio of the total mortgage payments for the year divided by the amount of money borrowed.

Solution

Calculate an overall capitalization rate by the band of investment method using the information from Sample Comparable #1 on pages 15-17. Your research indicates that investors are requiring a 13% return on these types of properties

Debt .75 x .0739 = .0554

Equity .25 x .13 = .0325

OAR =.0879 or 8.79%

DEVELOPMENT OF OVERALL CAPITALIZATION RATE – Net Income Ratio Method

Formula of Overall Rate (R_o) using Net Income Ratio and Effective Gross Income Multiplier:

$$R_o = \frac{\text{NIR}}{\text{Effective GIM}}$$

Assume:

Net Income Ratio = 60%

Effective Gross Income Multiplier = 4.8

$$R_o = \frac{0.60}{4.8} = 0.125 \quad \text{or} \quad 12.5\%$$

Problem

Calculate an overall capitalization rate by the net income ratio method using the information from Sample Comparable #1 on pages 15-17

DEBT COVERAGE RATIO METHOD OF COMPUTING THE OVERALL RATE

$$DCR = \frac{NOI}{I_m}$$

I_m = Annual Debt Service

$$R_o = DCR \times R_m \times M$$

Debt Coverage Ratio | Mortgage Constant | Mortgage Ratio

Assume:

Net operating income	$700,000
Annual debt service	$511,740
Loan-to-Value Ratio	75%
Annual Mortgage Requirement	11.19%

Debt Coverage Ratio calculation:

$$DCR = \frac{\$700,000}{\$511,740} = 1.3679$$

Overall Rate (R_o) calculation:

R_o = 1.3679 x 0.1119 x 0.75
= 0.1148
=0.115 (rounded)

Problem

Calculate an overall capitalization rate by the debt coverage ratio method using the information from Sample Comparable #1 on pages 15-17.

DEVELOPMENT OF OVERALL CAPITALIZATION RATE – Net Income Ratio Method

Formula of Overall Rate (R_o) using Net Income Ratio and Effective Gross Income Multiplier:

$$R_o = \frac{\text{NIR}}{\text{Effective GIM}}$$

Solution

Calculate an overall capitalization rate by the net income ratio method using the information from Sample Comparable #1 on pages 15-17

$$R_o = \frac{0.52}{5.51} = 0.0944 \quad \text{or} \quad 9.44\%$$

DEBT COVERAGE RATIO METHOD OF COMPUTING THE OVERALL RATE

$$\text{DCR} = \frac{\text{NOI}}{I_m}$$

$$R_o = \underset{\text{Debt Coverage Ratio}}{\text{DCR}} \times \underset{\text{Mortgage Constant}}{R_m} \times \underset{\text{Mortgage Ratio}}{M}$$

Solution

Calculate an overall capitalization rate by the debt coverage ratio method using the information from Sample Comparable #1 on pages 15-17.

DCR	x	R_m	x	M	
Debt Coverage Ratio		Mortgage Constant		Mortgage Ratio	
1.70	**x**	**.0739**	**x**	**.75**	**= .0942**
					or 9.42%

QUIZ #1

1. The underlying principle which provides the basis of the income capitalization approach is:
   A. Change
   B. Balance
   C. Conformity
   D. Anticipation

2. The basic equation used in the income approach to value is:
   A. Rate divided by income equals value
   B. Income divided by rate equals value
   C. Rate times income equals value
   D. Rate plus income equals value

3. Which of the following is <u>not</u> a typical unit of comparison in the valuation of an apartment building?
   A. price per acre
   B. price per square foot
   C. price per dwelling
   D. price per room

4. The income approach to value:
   A. is based on the principle of anticipation
   B. translates the ability of property to generate income into an indication of value
   C. requires an estimate of net operating income of property
   D. all of the above

5. Value is created by the anticipation of :
   A. Market Rent
   B. Gross Income
   C. Current Benefits
   D. Future Benefits

6. Capitalization is the process used to:
   A. Establish reproduction costs
   B. Establish mortgage payments
   C. Establish a depreciation schedule
   D. Convert income into an estimate of value

7. The rental income that a property would most probably command in the open market is called:
   A. Net Rent
   B. Gross Rent
   C. Market Rent
   D. Contract Rent

8. Which of the following is not an allowable expense from the appraiser's point of view?
   A. Advertising
   B. Depreciation
   C. Insurance
   D. Maintenance

9. Why does an appraiser prepare a reconstructed operating statement when using the income approach?
   A. To study historical trends of income in the market area.
   B. To develop a true statement of profits since the owner's statement always shows a loss.
   C. To develop an estimated projection of expected income and expense that will reflect the earning capacity of the property.
   D. To compare to financial statements in the income approach.

10. The anticipated income from all operations of the property adjusted for vacancy and collection losses, and miscellaneous income is called:
   A. Pre-Tax Income
   B. Net Operating Income
   C. Potential Gross Income
   D. Effective Gross Income

11. Which of the following statements best describes the amount of adjustment an appraiser should make for vacancy allowance in a property?
   A. 5 percent of gross income
   B. 1 percent for each year the property has been rented
   C. Somewhere between 5 percent and 10 percent
   D. The amount will vary with each property

12. An allowance for vacancy and collection loss is usually estimated as a percentage
   of:
   A. Potential Gross Income
   B. Effective Gross Income
   C. Net Operating Income
   D. Operating Expenses

13. If an income property has an annual effective gross income of $64,000 with total expenses of $30,000, what is the operating expense ratio?
    A. 2.13
    B. 0.27
    C. 0.73
    D. 0.47

14. In reconstructing an income statement for an apartment complex, you estimate that the potential gross income is $500,000. The vacancy and collection loss allowance is 6 percent. If operating expenses are $205,000, what is the operating expense ratio (rounded)?
    A. 41 percent
    B. 44 percent
    C. 45 percent
    D. Operating expense ratio cannot be determined without knowing the amount of the mortgage payment.

15. When calculating net operating income, which of the following expenses is <u>not</u> a proper deduction from gross income?
    A. Maintenance Expense
    B. Income Tax Expense
    C. Insurance Expense
    D. Management Expense

16. A reconstructed statement of net operating income should include which of the following?
    A. Tax Depreciation
    B. Management Charges
    C. Additions to Capital
    D. Mortgage Interest Payments

Quiz #1 Solutions

1. D
2. B
3. A
4. D
5. D
6. D
7. C
8. B
9. C
10. D
11. D
12. A
13. D
14. B
15. B
16. B

Quiz # 2

1. A property has a net operating income of $10,000, interest payments of $8,000 and principal payments of 1,000. What is the debt coverage ratio (DCR)?
   A. 0.80
   B. 0.90
   C. 1.11
   D. 1.25

2. Given the following information:

Building Capitalization Rate:	0.11
Land Capitalization Rate:	0.09
Land Value as a percent of total value:	35%

   What is the overall capitalization rate by using the band-of-investment method?
   A. 0.097
   B. 0.100
   C. 0.103
   D. 0.110

3. An apartment property is valued at $420,000 and has a net income of $2,800 per month. Calculate the overall capitalization rate for this investment.
   A. .0667
   B. .0752
   C. .0800
   D. .1250

4. Given the following data on a commercial property:

Sale Price:	$100, 000
Land Value:	40 %
Remaining Economic Life:	20 years
Net Operating Income:	$12,000
Tax Rate:	2%

   What is the discount rate for the property?
   A. .070
   B. .080
   C. .090
   D. .110

Questions 5 and 6 are based on the following information:

Potential Gross Income:	$140,000
Vacancy and Collection Loss:	15%
Operating Expense:	$42,000
Mortgage Payment (Principle and Interest):	$51,800
Property Value:	$700,000
Loan-to-Value Ratio:	0.70

5. What is the net operating income?
   A. $63,000
   B. $77,000
   C. $98,000
   D. $83,000

6. What is the overall capitalization rate?
   A. 0.07
   B. 0.11
   C. 0.12
   D. 0.17

7. Use the following market data to develop an improvement (building) capitalization rate.

Sales Price:	$500,000	
Land Value:	$100,000	
Improvement (building) income:	$60,000	
Tax Rate:	2%	
First Mortgage (representing 50 percent of value):		6%
Equity Rate (representing 50 percent of value):		10%

   A. 0.09
   B. 0.10
   C. 0.13
   D. 0.15

8. Which of the following items is not needed to use the band-of-investment method of calculating a discount rate?
   A. Reversion
   B. Loan-to-Value Ratio
   C. Rate for Equity
   D. Rate of Debt

9. When estimating the market value of a fee simple estate, which of the following types of rent would be used?
   A. Fee Rent
   B. Contract Rent
   C. Market Rent
   D. Simple Rent

10. What is meant by the term discount rate?
   A. The difference between the face amount of an obligation and the amount advanced or received.
   B. The interest rate associated with the loan on a property.
   C. The annual return on the total property investment.
   D. The annual mortgage payment divided by the loan principal.

11. The percentage of depreciable asset that must be recaptured annually during the remaining economic life of the property is the:
   A. Effective Tax Rate
   B. After-Tax Rate
   C. Recapture Rate
   D. Nominal Interest Rate

12. The rate that is the percentage that annual real estate taxes are in relation to the property's total value is:
   A. Effective Tax Rate
   B. After-Tax Rate
   C. Recapture Rate
   D. Nominal Interest Rate

13. The components of the improvement capitalization rate are:
   A. discount rate, effective tax rate, nominal interest rate
   B. effective tax rate, recapture rate, discount rate
   C. effective tax rate, discount rate, net income rate
   D. discount rate, effective tax rate, net income rate

14. Develop the discount rate from the following data:

   First mortgage of 60% of value at a return of 10%
   Second mortgage of 20% of value at a return of 11%
   Equity position requires a return of 14%

   A. 0.100
   B. 0.105
   C. 0.110
   D. 0.115

Questions 15 and 16 are based on the following data:

Discount Rate:	9.5%
Remaining Economic Life:	25 years
Tax Rate:	2%

15. What is the improvement (building) capitalization rate?
    A. 0.115
    B. 0.125
    C. 0.145
    D. 0.155

16. What is the land capitalization rate?
    A. 0.115
    B. 0.125
    C. 0.145
    D. 0.155

17. The ratio of net operating income to effective gross income is called:
    A. Land Capitalization Rate
    B. Net Income Ratio
    C. Operating Expense Ratio
    D. Effective Gross Income Ratio

18. In a recent sale, the gross potential income was $45,000, net operating income was $20,000, and debt service was $18,500. What is the debt coverage ratio (DCR)?

    A. 1.08
    B. 1.17
    C. 2.25
    D. 2.43

19. Calculate the effective tax rate based on the following data:

Tax:	$4,375
Market Value:	$125,000

    A. 0.015
    B. 0.025
    C. 0.035
    D. 0.045

20. Derive the recapture rate using the market comparison method given the following data:

Sale Price:	$500,000
Land Value:	$100,000
Net Income:	$63,500
Discount Rate:	0.085
Effective Tax Rate:	0.022

A. 0.020
B. 0.025
C. 0.250
D. 0.205

21. Which of the following is <u>not</u> one of the methods of developing an overall capitalization rate?
A. Management Ratio
B. Band-of-Investment
C. Net Income Ratio
D. Debt Coverage Ratio

22. The effective gross income for a commercial property is $104,000 and the operating expenses for similar properties amount to 40% of effective gross income. The commercial property sold recently for $499,200. What is the overall capitalization rate?
A. 0.0833
B. 0.8333
C. 0.0125
D. 0.1250

23. Use the following market data to develop a land capitalization rate.

Sale Price:	$500,000
Improvement Value:	$400,000
Land Income:	$10,000
Tax Rate:	2%
First Mortgage (represents 50% of value):	6%
Equity Rate (represents 50% of value):	10%

A. 0.08
B. 0.09
C. 0.10
D. 0.11

24. A gross income multiplier (GIM) as used in a commercial appraisal, is obtained by dividing the:
    A. Sale price by annual potential or effective gross income
    B. Sale price by monthly potential gross income
    C. Overall capitalization rate by the sale price
    D. Annual effective gross income by the sale price

Quiz 2 Solutions

1. C DCR = NOI ÷ DS so… 10,000 ÷ 9,000 = **1.11**
2. C .35 x .09 = .0315
   .65 x .011 = .0715
   .**1030**
3. C 33,600 ÷ 420,000= **.08**

4. A

I	R	V
12,000	D____	L 40,000
(3,000)	R .05	B 60,000
(2,000)	T .02	T 100,000

   7,000 ÷ 100,000 = **.07**

5. B
6. B
7. D 60,000 (bldg. income) ÷ 400,000 (bldg. value) = **0.15**
8. A
9. C
10. C
11. C
12. A
13. B
14. C .60 x .10 = .06
    .20 x .11 = .022
    .20 x .14 = .028
    .110

15. D .095
.04 1÷ 25 =.04
.02
.155

16. A .095
.020
.115

17. B

18. A 20,000 ÷ 18,500 = **1.08**

19. C 4,375 ÷ 125,000 = **.035**

20. B

I	R	V
63,500	D .085	L 100,000
(42,500)	R__	B 400,000
(11,000)	T .022	T 500,000

10,000 ÷ 400,000 = **.025**

21. A

22. D 62,400 ÷ 499,200 = **.125**

23. C 10,000 ÷ 100,000 = **.10**

24. A

Quiz # 3

1. The residual technique used by the appraiser reflects:

   A. the manner in which recapture is received
   B. the known or unknown values of land, improvements or total property
   C. the quality of the income
   D. the shape of the income stream

2. Given the following information:

Gross economic income	$84,000
Vacancy and Collection:	3%
Allowable Expenses:	18% of effective gross income
Discount:	7%
Tax Rate:	2.6%
Remaining Economic Life of Improvement:	50 years
Improvement Value:	$375,000

   Estimate the value of this property using the land residual technique (round answer to nearest $100).

   A. $584,300
   B. $617,900
   C. $475,000
   D. $640,000

3. A gross income multiplier (GIM), as used in a commercial appraisal, is obtained by dividing the:

   A. sale price by the annual potential or effective gross income
   B. sale price by monthly potential gross income
   C. overall capitalization rate by the sale price
   D. annual effective gross income by the sale price

4. Direct capitalization is appropriate when the overall rate is developed from sales in which:

   A. The land-to-building ratios are similar to those of the subject property.
   B. The remaining economic lives are similar to those of the subject property.
   C. The income and expense ratios are similar to those of the subject property.
   D. All of the above.

5. Given the following information on a commercial property:

Sale Price:	$300,000
Land Value:	40%
Remaining Economic Life:	20 years
Net Operating Income:	$36,000
Tax Rate:	2%

Compute the discount rate for the property.

A. 7.0%
B. 8.0%
C. 9.0%
D. 11.0%

6. Given the following information:

Discount Rate:	6.2%
Recapture Rate:	4.0%
Effective Tax Rate:	2.0%

Improvements represent 70% of the total property value.

What is the overall rate for this property?

A. 5.74%
B. 8.54%
C. 9.50%
D. 11.0%

7. The subject property's net income is $15,000 per year. Comparable investments, which have sold are reported below.

Comparable	Net Income	Sales Price
1	$14,400	$120,000
2	$14,000	$147,400
3	$13,500	$122,700
4	$14,500	$152,600

All of the comparables sold recently and comparables 2 and 4 were most similar to the subject property. Using direct capitalization with an overall rate, what is the best estimate of the value of the subject property (rounded to the nearest $1,000)?

A. $125,000
B. $137,000
C. $143,000
D. $158,000

8. You are appraising a commercial property. You have net operating income of $100,000. You estimate the discount rate to be 10 percent, the recapture rate to be 4 percent, and the effective tax rate to be 1 percent. Land value is $200,000. What is the indicated value of the property using the building residual technique?
   A. $520,000
   B. $720,000
   C. $780,000
   D. $220,000

9. An income property appraisal technique where the property's discount rate is derived from weighting mortgage and equity rates is referred to as:
   A. discounting
   B. band-of-investment technique
   C. yield capitalization
   D. discounted cash flow analysis

10. Given the following information:

Building capitalization rate	0.14
Land capitalization rate	0.115
Land value as a percent of total value	20 percent

What is the overall capitalization rate by using the band-of-investment method?
   A. .112
   B. .120
   C. .125
   D. .135

11. The building capitalization rate is composed of what components?
   A. discount rate, effective tax rate, annuity rate
   B. effective tax rate, annuity rate, recapture rate
   C. discount rate, effective tax rate, recapture rate
   D. effective tax rate, recapture rate, mark-up rate

12. A property has a land value of $100,000, a net operating income of $35,000, a land capitalization rate of 10 percent, and a building capitalization rate of 12 1/2 percent. What is the value of the subject property?
   A. $150,000
   B. $200,000
   C. $250,000
   D. $300,000

Questions 13 and 14 are based on the following information.

Property sold recently for:	$500,000
Potential gross income:	$100,000
Vacancy and collection loss:	15 percent
Operating expenses	$30,000
Mortgage payment	$37,000
Loan-to-value ratio	0.70

13. What is the net operating income?
    A. $55,000
    B. $65,000
    C. $70,000
    D. $85,000

14. What is the indicated potential gross income multiplier?
    A. 4
    B. 5
    C. 7
    D. 8

Quiz #3 - Solutions

1. B

2. B

	I	R	V
	NOI 66,814	D .07	L_____
375,000 x .116 =	(43,500)	R .02	B 375,000
(Bldg. Value) x (Bldg. Rate)	23,314	T .026	T_____

23,314 ÷ .096 = 242,854 + 375,000 = **617,854**
(Land Income) ÷ (Land Rate) = Land Value + Bldg. Value = Total Value

3. A

4. D

5. A 36,000 ÷ 300,000 = .120 OAR
1÷20 = .05 .05 x .60 = (.030) Recapture Rate
(.02) ETR
.**07** Discount Rate

6. D .062
.04 x .70 = .0280
.02
.110

7. D 15,000 ÷ .095 = **157,894**

8. B

	I	R	V
	100,000	D .10	L 200,000
.11 x 200,000 =	(22,000)	R .04	B _____
	78,000	T .01	T_____

78,000 ÷ .15 = 520,000
(Bldg. Income) ÷ (Bldg. Rate) = Bldg. Value 520,000 + 200,000 = **720,000**

9. B

10. D .20 x .115 = .023
.80 x .14 = .1120

.135

11. C

12. D 100,000 x .10 = 10,000
(Land Value) x (Land Rate) = Land Income
NOI 35,000
Land Income (10,000)
Bldg. Income 25,000 ÷ .125 = 200,000 + 100,000 = **300,000**
(Bldg. Rate) = Bldg. Value + Land Value = Total Value

13. A

14. B 500,000 ÷ 100,000 = **5.0**

DEVELOPMENT OF AN OVERALL CAPITALIZATION RATE
Net Income Ratio Method

PROBLEM

Using the following market data answer questions 1 through 7.

A 10-unit apartment complex is receiving market rents of $600 per month. Vacancy and collection losses are projected to be six percent. Expenses are forecast to be $22,500. The property recently sold for $439,930.

1. What is the potential gross income?

2. What is the effective gross income?

3. What is the net operating income?

4. What is the expense ratio?

5. What is the net income ratio?

6. What is the effective gross income multiplier?

7. What is the overall capitalization rate?

DEVELOPMENT OF AN OVERALL CAPITALIZATION RATE
Net Income Ratio Method

SOLUTION

1. What is the potential gross income?
   10 apartments x 12 months x $600/month = $72,000

2. What is the effective gross income (EGI)?

Potential Gross Income	**$72,000**
Less Vacancy & Collection Loss @ 6%	**- 4,320**
Effective Gross Income (EGI)	**$67,680**

3. What is the net operating income?

Effective Gross Income	**$67,680**
Less Operating Expenses	**-22,500**
Net Operating Income	**$45,180**

4. What is the expense ratio (OER)?
   Operating expenses divided by Effective Gross Income = OER
   $22,500 ÷ $67,680 = 33.24%

5. What is the net income ratio?
   1 = OER or Net Operating Income divided by Effective Gross Income
   100% = 33.24% = 66.76% or $45,180 ÷ $67,680 = 66.76%

6. What is the effective gross income multiplier?
   EGIM = Sale Price divided by Effective Gross Income
   $439,930 ÷ $67,680 = 6.5 (EGIM)

7. What is the overall capitalization rate?
   Net Income Ratio divided by the Gross Income Multiplier = R_o
   66.76% ÷ 6.5 = 10.27% (OAR)

COMPUTATION OF OVERALL RATE BY VARIOUS METHODS

PROBLEM

Given the following information:

- Sales Price $2,500,000
- Land Value $500,000
- First Mortgage (75% of total value) 8.00%
- Equity Rate 12.00%
- Net Operating Income $330,000
- Tax Class Rate 1.25%
- Tax Capacity Tax Ext. Rate 120.35%
- Remaining Economic Life 25 Years
- Annual Mortgage Constant (R_m) 0.10
- Effective Gross Income $423,076.92
- Operating Expense Ratio 22%

Compute the Overall Capitalization Rate (R_o) by using:

A. Debt Coverage Ratio Method
B. Net Income Ratio Method
C. IRV Formula (Comparable Sales Method)

What is the:

D. Effective tax rate
E. Recapture Rate (straight-line method)

COMPUTATION OF OVERALL RATE BY VARIOUS METHODS

SOLUTION

Given the following information:

- Sale Price $2,500,000
- Land Value 500,000
- First Mortgage (75% 0f total value) 8.00%
- Equity Rate 12.00%
- Net Operating Income $330,000
- Tax Class Rate 1.25%
- Tax Capacity Tax Ext. Rate 120.35%
- Remaining Economic Life 25 yrs.
- Annual Mortgage Constant (R_m) 0.10
- Effective Gross Income $423,076.92
- Operating Expense Ratio 22%

Solution:

A. DCR= $\frac{\$330,000}{\$187,500}$ = 1.76 x .10 x .75 = .**132**

B. V $\frac{\$\ 2,500,000}{\$423,077}$ = 5.909 IF $\frac{NIR}{EGIM}$ $\frac{.78}{5.909}$ = .**132**

C. $330,000/ $2,500,000 = **.132**

D. .0125 x 1.2035 = **.015**

E. $\frac{1}{25}$ = **.04**

SUPPLEMENTAL PROBLEM

Sale #	Sales Price	Land Value	Net Income	Discount Rate	Building Recapture Rate	Effective Tax Rate	Overall Rate
1	$500,000	$200,000		10.00%	2.00%		12.00%
2	$250,000	$50,000	$41,000	12.00%	3.00%	2.00%	
3	$100,000	$40,000			2.00%	1.00%	14.20%
4	$90,000	$30,000		10.00%		2.00%	14.67%
5	$110,000	$40,000	$18,200		4.00%	1.00%	
6	$480,000	$80,000		11.00%	3.00%	1.50%	
7	$300,000	$100,000	$50,000	12.00%	4.00%		
8	$60,000	$10,000	$11,500	14.00%		1.00%	19.17%
9	$120,000	$40,000	$18,000	11.00%	2.00%		
10	$900,000	$200,000	$158,500		4.00%	2.50%	

Fill in the blanks in the above table by using the market comparison techniques discussed in this section.

DEVELOPING RATES FROM MARKET DATA

SUPPLEMENTAL - SOLUTION

Sale #	Sales Price	Land Value	Net Income	Discount Rate	Building Recapture Rate	Effective Tax Rate	Overall Rate
1	$500,000	$200,000	$60,000	10.00%	2.00%	0.80%	12.00%
2	$250,000	$50,000	$41,000	12.00%	3.00%	2.00%	16.40%
3	$100,000	$40,000	$14,200	12.00%	2.00%	1.00%	14.20%
4	$90,000	$30,000	$13,203	10.00%	4.00%	2.00%	14.67%
5	$110,000	$40,000	$18,200	12.99%	4.00%	1.00%	16.55%
6	$480,000	$80,000	$72,000	11.00%	3.00%	1.50%	15.00%
7	$300,000	$100,000	$50,000	12.00%	4.00%	2.00%	16.67%
8	$60,000	$10,000	$11,500	14.00%	5.00%	1.00%	19.17%
9	$120,000	$40,000	$18,000	11.00%	2.00%	2.67%	15.00%
10	$900,000	$200,000	$158,500	11.99%	4.00%	2.50%	17.61%

1. Net Operating Income

Net operating income = R_o x V = 0.12 x $500,000 = $60,000

Effective Tax Rate

Net operating income =	$60,000
Less: Discount income ($500,000 x 0.10)	- 50,000
Recapture income ($300,000 x .02)	- 6,000
Income necessary to pay real estate taxes	$ 4,000

Effective Tax Rate = ($4,000 ÷ $500,000) 0.008 or .80%

Or

Recapture Rate 2.00% x .60 building value = 1.20 (recapture rate in OAR)

OAR	12.00%
minus Discount Rate	10.00%
minus Recapture Rate	1.20%
Effective Tax Rate	.80%

2. Overall Rate (R_o)

R_o = I ÷ V R_o = $41,000 ÷ $250,000 = 0.164 or 16.4%

3. Net Operating Income

Net operating income = R_o x V = 0.142 x $100,000 = $14,200

Discount Rate

= OAR	14.20%	
minus Recapture Rate	1.20%	(2.00% x .60)
minus Effective Tax Rate	1.00%	
Discount Rate	12.00%	

4. Net Operating Income

Net operating income = R_o x V = 0.1467 x $90,000 = $13,203

Building Recapture Rate

= OAR	14.67%
minus Effective Tax Rate	2.00%
minus Discount Rate	10.00%
Recapture Rate in OAR	2.67 ÷
Percent Building Value	.6667 =
Building Recapture Rate	4.00%

5. Overall Rate (R_o)

R_o = I ÷ V R_o = $18,200 ÷ $110,000 = 0.1655 or 16.55%

Discount Rate

= OAR	16.55%	
minus Recapture Rate	2.56%	(4.00% x .64)
minus Effective Tax Rate	1.00%	
Discount Rate	12.99%	

6. Overall Rate (R_o)

= Discount Rate	11.00%	
plus Recapture Rate	2.50%	(3.00% x .833)
plus Effective Tax Rate	1.50%	
Overall Rate	15.00%	

Net Operating Income

R_o x V = 0.15 x $480,000 = $72,000

7. Overall Rate (R_o)

$R_o = I \div V$ $R_o = \$50,000 \div \$300,000 = 0.1667$ or 16.67%

Effective Tax Rate

= OAR	16.67%	
minus Discount Rate	12.00%	
minus Recapture Rate	2.67%	(4.00% x .667)
Effective Tax Rate	2.00%	

8. **Building Recapture Rate**

= OAR	19.17%	
minus Effective Tax Rate	1.00%	
minus Discount Rate	14.00%	
Recapture Rate in OAR	4.17 ÷	
Percent Building Value	.833 =	
Building Recapture Rate	5.00%	

9. **Overall Rate (R_o)**

$R_o = I \div V$ $R_o = \$18,000 \div \$120,000 = 0.15$ or 15%

Effective Tax Rate

= OAR	15.00%	
minus Discount Rate	11.00%	
minus Recapture Rate	1.33%	(2.00% x .667)
Effective Tax Rate	2.67%	

10. Overall Rate (R_o)

$R_o = I \div V$ $R_o = \$158,000 \div \$900,000 = 0.1761$ or 17.61%

Discount Rate

= OAR	17.61%	
minus Recapture Rate	3.12%	(4.00% x .78)
minus Effective Tax Rate	2.50%	
Discount Rate	11.99%	

MEASURES OF CENTRAL TENDENCY

Measures of central tendency describe the overall level at which properties are assessed. The first step in calculating any measure of central tendency is to calculate an individual ratio for each sale.

Sales Ratio – The sales ratio is determined by dividing assessed value by sale price.

$$\textbf{Sales Ratio} = \frac{\textbf{Assessor EMV}}{\textbf{Sales Price}}$$

Assessor EMV	Sales Price	Sales Ratio
$ 230,500	$ 259,000	.89
$ 197,500	$ 250,000	.79
$ 168,000	$ 200,000	.84
$ 197,800	$ 215,000	.92
$ 175,800	$ 217,000	.81
$ 221,000	$ 260,000	.85
$ 195,800	$ 225,000	.87
$1,386,400	$1,626,000	

Array – Arrangement of ratios in order of magnitude from highest to lowest (or visa versa).

.79 .81 .84 .85 .87 .89 .92

Mean Ratio– The mathematical average of the ratios. Add all ratios together and divide by the number of ratios.

.79 .81 .84 .85 .87 .89 .92 = 5.97 divided by 7 = **.853**
Mean Ratio

Aggregate Mean Ratio – also called Weighted Mean. The aggregate mean ratio is determined by dividing the total Assessor's EVMs for all properties by the total sales prices of all properties. This ratio is used to calculate the Price-Related Differential.

$$\textbf{Aggregate Mean Ratio} = \frac{\textbf{Sum of all Assessor's EMVs}}{\textbf{Sum of all Sales Prices}}$$

Aggregate Mean Ratio = $\frac{\$1,386,400}{\$1,626,000}$ = **.853 Aggregate Mean Ratio**

Median Ratio - The midpoint or middle ratio in a group of ratios arranged from highest to lowest (or visa versa). When there is an even number of ratios, the median is found by adding the two midpoint ratios together and dividing by two.

.79 .81 .84 **.85** .87 .89 .92
Median

(----- .81 .84 .85 .87 .89 .92)
.86 Median (.85+.87 = 1.72 divided by 2 = .86)

MEASURES OF UNIFORMITY

Measures of uniformity measure the quality and uniformity of the assessment.

Range – The difference between the largest ratio and the smallest ratio. A large range typically indicates poor uniformity. However, the range is highly susceptible to extreme ratios.

Range = Largest Ratio – Smallest Ratio

.92 - .79 = **.13 Range**

Average Absolute Deviation – The average difference between each individual ratio and the median ratio. Add each absolute (disregard +/-) deviation together and divide by the number of ratios. This statistic is used to calculate the COD.

Individual Ratio	Median	Deviation	Absolute Deviation
.79	.85	-.06	.06
.81	.85	-.04	.04
.84	.85	-.01	.01
.85	.85	.00	.00
.87	.85	.02	.02
.89	.85	.04	.04
.92	.85	.07	.07
			.24

AAD = .24 divided by 7 = **Average Absolute Deviation .034**

Coefficient of Dispersion – A measure of uniformity indicating the degree to which individual ratios vary from the median. A low COD indicates a uniform assessment. A high COD indicates a non-uniform assessment.
IAAO standards suggest single family residential CODs should generally be less than 15. A COD under 10 is considered excellent uniformity.

$$\text{COD} = \frac{\text{Average Absolute Deviation}}{\text{Median}} \times 100$$

$$\text{COD} = \frac{.034}{.85} \times 100 = \textbf{COD 4.00}$$

Price Related Differential – Measures the relationship between the mean ratio and the aggregate mean ratio. Divide the mean ratio by the aggregate mean ratio and then multiply by 100. A PRD of 100 is desirable. Based on IAAO guidelines, PRDs between 98 and 103 would still be considered acceptable.

Appraisal uniformity is said to be **Regressive** if high-value properties are under assessed compared to low-value properties. **PRD is greater than 103**

Appraisal uniformity is said to be **Progressive** if high-value properties are over-assessed compared to low-value properties. **PRD is less than 98**

$$\text{PRD} = \frac{\text{Mean}}{\text{Aggregate Mean}} \times 100$$

$$\text{PRD} = \frac{.853}{.853} \times 100 = \textbf{PRD 100}$$

PROBLEM 7-1

Round to three decimals in all calculations – 1.111 or 0.999
Calculate the individual sales ratios:

Sale No.	Address	Sale Date	Sale Price	Assessor's 2004 EMV	Sales Ratio
1	552 Maple St.	Dec-03	$212,000	$213,000	
2	46 Bluebird St.	Feb-04	$228,000	$219,000	
3	103 Maple St.	Apr-04	$289,000	$221,000	
4	124 Elm St.	Oct-03	$188,000	$199,000	
5	133 Oak St.	May-04	$350,000	$234,000	
6	224 Pine St.	Mar-04	$333,000	$232,000	
7	466 Oak St.	Apr-04	$360,000	$265,000	
8	251 Ash St.	Nov-03	$308,000	$254,000	
9	356 Walnut St.	Aug-04	$230,000	$221,000	
10	52 Robin Way	Jan-04	$250,000	$246,000	
11	62 Finch Way	May-04	$300,000	$208,000	

Mean:_____ Weighted Mean Ratio:_____

Array ratios:

Array Ratios	Absolute Deviation from Median Ratio

Median: _____

Range: _____

Average Absolute Deviation from the Median – AAD: _____

COD: _____

PRD: _____

What determinations can you make about the assessment's quality and uniformity?

PROBLEM 7-2

Round to three decimals in all calculations – 1.111 or 0.999
Calculate the individual sales ratios:

Sale No.	Address	Sale Date	Sale Price	Assessor's 2004 EMV	Sales Ratio
1	128 13th St.	Dec-03	$175,000	$157,500	
2	564 18th St.	Feb-04	$164,000	$142,700	
3	223 15th St.	May-04	$154,000	$126,300	
4	103 View Ln.	Oct-03	$193,000	$154,400	
5	400 11th St.	Apr-04	$187,000	$166,400	
6	348 16th St.	May-04	$171,000	$131,700	
7	222 Look Ln.	Aug-04	$198,000	$182,200	
8	551 17th St.	Mar-04	$159,000	$144,700	
9	454 15th St.	Jan-04	$177,000	$146,900	
10	367 12th St.	Nov-03	$149,000	$140,100	

Mean: _____ Weighted Mean Ratio: _____

Array ratios:

Array Ratios	Absolute Deviation from Median Ratio

Median: _____

Range: _____

Average Absolute Deviation from the Median – AAD: _____

COD: _____

PRD: _____

PROBLEM 7-2(continued)

What determinations can you make about the assessment's quality and uniformity?

PROBLEM 7-1

SOLUTION

SALES STUDY PROBLEM #1

Round to three decimals in all calculations – 1.111 or 0.999

Calculate the individual sales ratios:

Sale No.	Address	Sale Date	Sale Price	Assessor's 2004 EMV	Sales Ratio
1	552 Maple St.	Dec-03	$212,000	$213,000	1.005
2	46 Bluebird St.	Feb-04	$228,000	$219,000	0.961
3	103 Maple St.	Apr-04	$289,000	$221,000	0.765
4	124 Elm St.	Oct-03	$188,000	$199,000	1.059
5	133 Oak St.	May-04	$350,000	$234,000	0.669
6	224 Pine St.	Mar-04	$333,000	$232,000	0.697
7	466 Oak St.	Apr-04	$360,000	$265,000	0.736
8	251 Ash St.	Nov-03	$308,000	$254,000	0.825
9	356 Walnut St.	Aug-04	$230,000	$221,000	0.961
10	52 Robin Way	Jan-04	$250,000	$246,000	0.984
11	62 Finch Way	May-04	$300,000	$208,000	0.693
		Totals	$3,048,000	$2,512,000	9.355

Mean: 9.355/11 = **0.850** Weighted Mean Ratio: 2,512,000/3,048,000 = **0.824**

Array ratios:

Array Ratios	Absolute Deviation from Median Ratio
0.669	.156
0.693	.132
0.697	.128
0.736	.089
0.765	.060
0.825	.000
0.961	.136
0.961	.136
0.984	.159
1.005	.180
1.059	.234
Total	1.410

Median: **0.825**

Range: 0.669 – 1.059 = **0.390**

Average Absolute Deviation from the Median – AAD: 1.410/11 = **0.128**

COD: 0.128/0.825 X 100 = **15.515**

PRD: 0.850/0.824 X 100 = **103.15**

PROBLEM 7-1

SOLUTION:

What determinations can you make about the assessment's quality and uniformity?

The COD over 15.00 indicates that the assessment is not uniform. There is a large range between the highest and lowest ratios, which further illustrates that there is a great deal of dispersion and the quality of the assessment is questionable.

The PRD indicates that the assessment is Regressive. The high-valued properties are under assessed compared to low-valued properties.

The median ratio of 82.5 indicates a low level of assessment and is not in compliance with State standards

PROBLEM 7-2

SOLUTION:

SALES STUDY PROBLEM #2

Round to three decimals in all calculations – 1.111 or 0.999

Calculate the individual sales ratios:

Sale No.	Address	Sale Date	Sale Price	Assessor's 2004 EMV	Sales Ratio
1	128 13th St.	Dec-03	$175,000	$157,500	0.900
2	564 18th St.	Feb-04	$164,000	$142,700	0.870
3	223 15th St.	May-04	$154,000	$126,300	0.820
4	103 View Ln.	Oct-03	$193,000	$154,400	0.800
5	400 11th St.	Apr-04	$187,000	$166,400	0.890
6	348 16th St.	May-04	$171,000	$131,700	0.770
7	222 Look Ln.	Aug-04	$198,000	$182,200	0.920
8	551 17th St.	Mar-04	$159,000	$144,700	0.910
9	454 15th St.	Jan-04	$177,000	$146,900	0.830
10	367 12th St.	Nov-03	$149,000	$140,100	0.940
		Totals	$1,727,000	$1,492,900	8.650

Mean: 8.650/10 = **0.865** Weighted Mean Ratio: 1,492,900/1,727,000 = **0.864**

Array ratios:

Array Ratios	Absolute Deviation from Median Ratio
0.770	0.110
0.800	0.080
0.820	0.060
0.830	0.050
0.870	0.010
0.890	0.010
0.900	0.020
0.910	0.030
0.920	0.040
0.940	0.060
Total	0.470

Median: 0.870+0.890=1.760/2 = **0.880**

Range: 0.77 – 0.94 = **0.170**

Average Absolute Deviation from the Median – AAD: 0.470/10 = **0.047**

COD: 0.047/0.880 X100 = **5.341**

PRD: 0.865/0.864 = **100.1**

PROBLEM 7-2

SOLUTION:

What determinations can you make about the assessment's quality and uniformity?

A COD of 5.341 indicates the assessment has excellent uniformity. The range of 0.170 between the highest and lowest ratios indicates a good level of uniformity: the ratios are not widely dispersed.

The PRD at 100.1 indicates that the assessment is unbiased. The high-valued properties and the low-valued properties have the same level of assessment. Overall this assessment is excellent.

The median ratio of 88.0 indicates a low level of assessment and is not in compliance with State standards