

Math Relating to Real Property Appraisals

1. Sales Comparison Approach

A. If the comparable property is superior in a feature, you subtract value from the comparable.

Example: Comp #1 has a 1-car garage and sold for \$70,000. The subject property does not have a garage. The value of a 1-car garage is \$2,000. What would be the adjustment?

Solution:

<u>Subject</u>	<u>Comparable</u>
No Garage	\$70,000
	<u>-\$2,000 garage</u>
	\$68,000

B. If the comparable property is inferior in a feature you add value to the comparable.

Example: Comp #1 has 3 bedrooms and the subject has 4 bedrooms, with the value of a bedroom being \$800. Comp #1 sold for \$70,000.

Solution:

<u>Subject</u>	<u>Comparable</u>
Bedrooms	\$70,000
	<u>+ \$800 extra bedroom</u>
	\$70,800

C. Final Adjustment to above examples, if used in the same Market Data Approach.

\$70,000 What comparable sold for
 -\$2,000 Garage adjustment
+ \$800 Bedroom adjustment
 \$68,800 Estimated value of subject property

D. **Time Adjustment.** If a comparable sold some time ago, and market value has generally been increasing over time, it is necessary to make a time adjustment.

Example: Two dwellings, having no appreciable differences, one sold this week for \$62,250 and one sold 6 months ago for \$59,000. The difference of \$3,250 can be assumed to be due to increasing market value over the 6 month period. What would be annual rate of appreciation?

Solution: $\$62,250 - \$59,000 = \$3,250$ appreciation

$\$3,250 \div \$59,000 = .055 = 5.5\%$ appreciation over 6 months

$5.5\% \times 2 = 11\%$ annual rate of appreciation

All sales (comparables) used could be adjusted upward. Add the increase in value to the comparables.

2. Cost Approach: There will be no math questions on the salesman exam involving cost approach. You should, however, be aware of Straight-line depreciation problems and perhaps some appreciation problems. These will be discussed below.

A. **Depreciation** is a loss of utility and hence value from any causes whether it is physical deterioration, functional, or economic obsolescence. There are several methods of determining amounts of depreciation, you need only be concerned with the Age/Life (straight-line) method.

Effective Age to Economic Life Ratio gives an accrued percent of depreciation.

Example: A house is chronologically 30 years old. Because of excellent construction, its economic life is estimated to be 60 years. Because of its excellent maintenance and up-keep its effective age is 22 years. What would be the depreciation?

Solution: Effective age divided by economic life = accrued depreciation

$22 \div 60 = .366 = 36.6\%$ Accrued Depreciation

B. **Appreciation** is an increase in value. Original cost times accrued percentage rate of appreciation equals appreciation. Add to the original value.

Example: You bought a lot 5 years ago for \$3,000 and it has appreciated 2% per year. What is its present value?

Solution: $5 \text{ years} \times 2\% = 10\%$ Accrued Appreciation

$\$3,000 \times 1.10 = \$3,300$ present value

Example: You recently sold a lot for \$8,000 that you had purchased 5 years ago for \$5,000. What was rate of appreciation?

Solution: $\$8,000 - \$5,000 = \$3,000$ appreciation, divided by $\$5,000 = .60 = 60\%$

3. Practice Problems

A. One comparable sold last week for \$81,000. A similar property sold 6 months ago for \$78,500. What is annual rate of appreciation that may be used as a time adjustment?

- (a) 3.1% (b) 6.4% (c) 3% (d) 6%

B. The subject property has 1,500 SF, a den and one bath. Comparable #1 sold for \$50,000, has 1,300 SF, one den and 2 baths. Comparable #2 sold for \$59,000, had 1,600 SF, one den and 2 baths. Comparable #3 sold for \$61,000, has 1,600 SF, one den and 3 baths. What would be a good selling price for the subject property?

- (a) \$50,000 (b) \$61,000 (c) \$54,000 (d) \$59,500

C. A builder estimates cost per square foot is \$43.36 for a brick ranch house. You are appraising a brick ranch house with 2,300 square feet. It is 21 years old; its economic life is 55 years and its effective age is 32 years. What would be the percentage of depreciation?

- (a) 38% (b) 26% (c) 58% (d) 17%

I. Using the same figures, what would be amount of depreciation in dollars?

- (a) \$37,896.64 (b) \$41,385.76 (c) \$25,929 (d) \$57,842.24

II. Using the same figures, what would be indicated value of the house?

- (a) \$61,832 (b) \$41,885.76 (c) \$57,842.24 (d) \$73,799

III. Using the same figures, if the lot was bought new for \$8,000 and in 21 years had increased in value by 250%, what would be total indicated value of the whole property (land and house)?

- (a) \$81,832 (b) \$93,799 (c) \$77,842.24 (d) \$61,885.76

D. The value of a house at the end of eight years was estimated to be \$28,000. What was the value of the house when new, if the yearly depreciation rate is 2½%?

- (a) \$37,000 (b) \$35,000 (c) \$36,000 (d) \$28,700

E. A new home and lot cost \$17,000 five years ago. Of this total price, it was estimated that the lot had a value of \$4,500. Assuming an annual depreciation of 2½% on the house and an annual increase in value of 6% on the lot, what is the total value of the property today?

- (a) \$10,937 (b) \$58,500 (c) \$16,787.50 (d) \$18,920

F. A building has a present value of \$14,500. What was the original cost if it has depreciated at 2½% for the past 10½ years?

- (a) \$19,661 (b) \$18,200 (c) \$25,085 (d) \$19,061.11

G. The subject property has 3,000 square feet, no garage, but does have a patio. Comparable #1 recently sold for \$100,000, has 2,800 square feet, a garage and a patio. Comparable #2 recently sold for \$110,000, has 3,000 square feet, a garage and a patio. Comparable #3 recently sold for \$86,000, has 2,600 square feet, no garage, but does have a patio. Determine fair market value for the subject property.

- (a) \$108,000 (b) \$110,000 (c) \$106,000 (d) \$98,000

H. A subject property is 1,450 SF and a comparable is 1,600 SF and recently sold for \$32.50 per square foot. Subject has a patio worth \$4,000; comp does not have a patio. Comparable house has a land value of \$10,000. Land value on the subject property is \$3,000 more than the comparable. What would be a good sales price of the subject property?

- (a) \$54,125 (b) \$49,875 (c) \$49,250 (d) \$47,125

Solutions to Math Appraisal Practice Problems

A. $\$81,000 - \$78,500 = \$2,500$ accrued appreciation
 $\$2,500 \div \$78,500 = .0318 \times 2 = .0636 = 6.4\%$ (b)

B.	Subject	Comp #1	Comp #2	Comp #3
		\$50,000	\$59,000	\$61,000
	1,500 SF	1,300 SF	1,600 SF	1,600 SF
	Den	Den	Den	Den
	1 Bath	2 Baths	2 Baths	3 Baths

Step 1: Comp #1 and #2 are the same except for square footage

Comp #2 sold for \$59,000 with 1,600 SF
 Comp #1 sold for -\$50,000 with -1,300 SF
 \$9,000 300 SF
 \$9,000 divided by 300 SF = \$30 per SF

Step 2: Comps #2 and #3 are the same except for baths

Comp#3 sold for \$61,000 with 3 baths
 Comp #2 sold for -\$59,000 with -2 baths
 \$2,000 1 bath
 One bath = \$2,000

Step 3: Compare each comp individually with the subject property making appropriate adjustments for differences:

Square Foot Adjustment:

Comp #1 has 1,300 SF, Subject has 1,500 SF at \$30 per SF. $200 \text{ SF} \times \$30 = \$6,000$. Comp #1 is inferior to subject, add \$6,000.

Comp #2 has 1,600 SF, subject has 1,500 SF at \$30 per SF. $100 \text{ SF} \times \$30 = \$3,000$. Comp #2 is superior to subject, subtract \$3,000.

Comp #3 square foot adjustment is the same as Comp #2

Bath Adjustment:

Comp #1 has 2 baths, subject has 1 bath at \$2,000 per bath. Comp #1 is superior to subject, subtract \$2,000.

Comp #2 bath adjustment is same as Comp #1

Comp #3 has 3 baths, subject has 1 bath at \$2,000 per bath. Comp #3 is superior, subtract \$4,000 (2 baths).

<u>Subject</u>	<u>Comparable</u>
	\$70,000
No Garage	<u>-\$2,000 garage</u>
	\$68,000

Step 4: Final Adjustments

Subject Property	Comp #1	Comp #2	Comp #3
	\$50,000	\$59,000	\$61,000

C. Effective age = $32 \div \text{Economic life of } 55 = .58 = 58\%$ (c)

$\$43.36 \times 2,300 \text{ SF} = \$99,728 \times .58 = \$57,842.24$ (d)

(2) $\$99,728 - \$57,842.24 = \$41,885.76$ (b)

(3) $\$8,000 \times 2.5 = \$20,000$ land value

<u>+ \$41,885.76</u>	depreciated improvement value
\$61,885.76	(d)

D. $2.5\% \times 8 \text{ years} - 20\%$ accrued depreciation

$\$28,000$ divided by $.80$ ($100\% - 20\%$) = \$35,000 (b)

E. 5 years x 6% = 30% increase on lot
 $\$4,500 \times 1.30 = \$5,850$ lot value

5 years x 2½% = 12.5% depreciation on house
 House value was originally \$12,500 (\$17,000 - \$4,500)
 $12,500 \times .125 = \$1,562.50$ amount of depreciation
 $\$12,500 - \$1,562.50 = \$10,937.50$ House value
 +\$5,850.00 Lot value
 \$16,787.50 (c)

F. 10.5 years x 2.5% = 26.25% depreciation
 (100% - 26.25% = 73.73%)
 $\$14,500 \div .7375 = \$19,661$ (a)

G.

Subject	Comp #1	Comp #2	Comp #3
	\$100,000	\$110,000	\$86,000
3,000 SF	2,800 SF	3,000 SF	2,600 SF
No Garage	Garage	Garage	No Garage
Patio	Patio	Patio	Patio

Step 1: Comp #2 and #1 are the same except for square footage.
 $\$110,000 - \$100,000 = \$10,000$
 $3,000 \text{ SF} - 2,800 \text{ SF} = 200 \text{ SF}$
 $\$10,000 \div 200 \text{ SF} = \50 per square foot

Step 2: Comp #2 sold for \$110,000
 Comp #3 sold for -\$86,000
 \$24,000
 $400 \text{ SF} \times \$50 = \underline{-\$20,000}$
 \$4,000 Value of the garage

Step 3: Final Adjustments

	Comp #1	Comp #2	Comp #3
SF	\$100,000	\$110,000	\$86,000
Garage	<u>+\$10,000</u>	<u>0</u>	<u>+\$20,000</u>
	\$106,000	\$106,000	\$106,000

Answer (c)

H. Square footage adjustment: $1,600 \text{ SF} - 1,450 \text{ SF} = 150 \text{ SF} \times \$32.50 = \$4,875$, Comp is superior, subtract \$4,875.

Patio: Comp is inferior, add \$4,000

Land: Comp is inferior, add \$3,000

Comp sold for \$52,000 (1,600 SF x \$32.50)
-\$4,875 Square foot adjustment
+\$4,000 Patio
+\$3,000 Land
\$54,125 Value of subject (a)