Math Review – Test 2

Revised August 2020

1. A man wants to borrow $125,000 and amortize it over 20 years. He will pay 8.5% interest. (a) What will his monthly P&I (principal and interest) payment be? (b) How much will the borrower pay in interest over the life of the loan? *(see the mortgage factor chart pg. 2)*

2. The mortgagee will be charging 1 (one) point on a loan. The sale price is $250,000 and the LTV is 80%. How much will the mortgagor pay, in points, at closing?

3. A borrower takes out a $15,000 Straight Loan with a 10% note rate. If the loan is paid off at the end of the first year, what will the final payment be if interest is paid on an annual basis?

4. A seller needs to net $100,000 after paying the real estate commission to have enough to pay off their mortgage loan, the other closing costs and have enough for the down payment on the next property. What is the MINIMUM acceptable sale price that would accomplish this if the commission is 6% of the sale price?

5. Sally buys a home for $275,000 with 90% LTV first mortgage at 6.5% annual interest, payable in equal monthly installments of $1,564.37 for P/I (principal and interest). What is the principal balance of the loan after making the first payment?

6. What is the annual real estate tax on a property that just sold for $188,000, was appraised at $190,000 and is assessed at $195,000 if the tax rate is 38 mills and an equalization factor of 120 percent is applied?

7. A woman wants to borrow $200,000 to buy a house. If she must pay 6.5% annual interest and can afford a monthly payment of $1,350 (principal and interest), what is the lowest number of years she can borrow the money?*(see the mortgage factor chart pg. 2)*

8. An investor is seeking an 11% return on their money and is considering a commercial property listed for $2.1 million dollars. The listing agent provides the following annual property data: Operating expenses are $133,000, mortgage payments are $56,000 and gross rents are $337,000. What purchase price would accomplish the investor's desired return on investment if a vacancy and loss factor of 4% was used?

9. The seller received a $121,600 check at closing after paying a 7 percent commission, $31,000 in other closing costs, and the $135,700 loan payoff. There were no other seller closing costs . What was the total sales price?

10. A couple plans to borrow $75,000 to buy a condominium. If they obtain mortgage money at 6% instead of 7.5% for a 30-year loan, how much lower will their monthly principal and interest payments be?*(see the mortgage factor chart pg. 2)*

11. A triplex rental property sold for $360,000, each of the units rent for 1,250 per month. With total monthly operating expenses of $650, what would the GRM (gross rent multiplier) be?

	Amortized Loans Life of Loan (in Years) (Monthly Payments per $1,000 of Loan Principal)							
Annual Interest Rate (%)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**
5.00	$18.87	$10.61	$7.91	$6.60	$5.85	$5.37	$5.05	$4.82
5.50	19.10	10.85	8.17	6.88	6.14	5.68	5.37	5.16
6.00	19.33	11.10	8.44	7.16	6.44	6.00	5.70	5.50
6.50	19.57	11.35	8.71	7.46	6.75	6.32	6.04	5.85
7.00	19.80	11.61	8.99	7.75	7.07	6.65	6.39	6.21
7.50	20.04	11.87	9.27	8.06	7.39	6.99	6.74	6.58
8.00	20.28	12.13	9.56	8.36	7.72	7.34	7.10	6.95
8.50	20.52	12.40	9.85	8.68	8.05	7.69	7.47	7.33
9.00	20.76	12.67	10.14	9.00	8.39	8.05	7.84	7.71
9.50	21.00	12.94	10.40	9.32	8.74	8.41	8.22	8.10
10.00	21.25	13.22	10.75	9.65	9.09	8.78	8.60	8.49
10.50	21.49	13.49	11.05	9.98	9.44	9.15	8.98	8.89
11.0	21.74	13.78	11.37	10.32	9.80	9.52	9.37	9.28

Answer Question #1:

a. The monthly P& I payment will be $1,085: on the mortgage factor chart find "facto" for 8.50% interest over a 20 year term which is 8.68, meaning $8.68 per month per $1000 of borrowed money. $125,000 loan amount equals 125 "thousand dollar" units, each at $8.68 per month. 125 x 8.68 = $1,085 monthly

b. Total interest over the life of the loan equals $135,400. Each monthly payment of $1,085 is principal and interest (P&I) combined. Over 20 years the total payments of P&I would equal $260,400, (12 x 20 = 240 X $1,085 = $260,400).

Total Payment over life of loan		$260,400 (P&I)
Less amount borrowed		- $125,000 (Principal)
Equals interest	=	$135,400 = interest

Answer Question #2:

$250,000 Sale price
X .80 LTV
$200,000 Loan amount

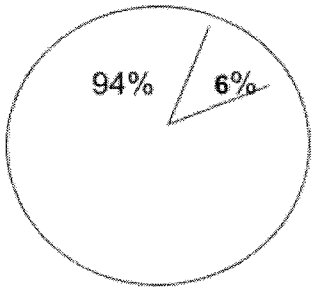
$200,000 x .01 = $2000 (one of the wrong answers will be $2,500)

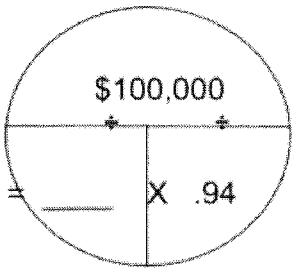
Answer Question #3:

Note: (the payoff of a mortgage loan is typically the (principal balance) + (accrued interest).

Annual interest :	**Pay off end of year 1:**	
$15,000	Principal Balance	$15,000
X .10	Accrued Interest	+ $1,500
= $1,500	= Payoff	**$16,500**

Answer Question 4: **Note: With a commission rate of 6%, the seller's "rate" is 94%.** So we divide the seller's "part" by the seller's "rate" to determine the "whole" sales price. If we knew the "whole" sales price, we could have multiplied that by the "seller's rate" of 94% to determine the "Seller's part". In this case we are just going backwards, letting the (whole, rate, part) model tell us what to do when we fill in the blanks with the info we know, or can find out.





$100,000 ÷ .94 = **$106,382.98**
total

Answer Question #5:

Sales Price	**$275,000**
LTV	**X .90**
loan amount	**$247,500**

	MONTH #1	MONTH #2
beginning loan bal.	$247,500	$247, 276.26
X note rate	X .065	X .065
= annual interest	$16,087.50	$16,072.96
annual interest	$16,087.50	$16,072.96
divided by 12	÷ 12	÷ 12
= month interest	$1,340.63	$1,339.41
constant mo. payment (P&I)	$1,564.37	$1,564.37
less mo. interest	-$1,340.63	- $1,339.41
$ for principal reduction	$223.74	$224.96
beginning loan balance	$247,500.00	$247,276.26
less principal reduction	-$223.74	- $224.96
= new loan balance	**$247,276.26 ***	**247,051.30**

*** $247,276.26 is the answer to question #5, ...month #2 is shown just to illustrate how the amortization process progressively works each month, the loan balance to will continue to decline (amortize) with each successive payment, so long as that payment is greater than the simple interest due.**

Answer Question #6

Assessed Value	$195,000
x Equalization Factor	x 1.20
= equalized value	$234,000
x tax rate (38 mills=.038)	X .038
= annual tax	= $8,892

ANSWER QUESTION #7:

Lowest number of years over which she could fully amortize the $200,000 loan is 25: $200,000 would be 200, $1,000 units. $1,350 ÷ 200 = 6.75, which is the factor for 6.5% at 25 years.

Or: in this problem you can play "what if" by plugging in various factors @ 6.5% interest rate to find the lowest number of years.

ANSWER QUESTION #8:

$337,000
-$13,480 less 4% vacancy and loss factor
-$133,000 less operating expenses
= $190,520 Net Operating Income (NOI)

Step 2: NOI divided by Cap Rate = Value
$190,520 ÷ .11 = $1,732,000

- ***Remember that mortgage payments (debt service)are not used to calculate NOI.***

ANSWER QUESTION#9: (Note: We don't know in dollars what 100% of the sales price was, but we do know what everything other than 7% was, or 93%)

The total amount disbursed after paying the 7% real estate fee was $288,300 = *($121,600 Seller's Net + $31,000 Closing Costs + $135,700 Loan Payoff)*

This amount is the "PART" left after paying the 7% fee and is thus equal to 93% of the "WHOLE" Sales Price. The 93% "RATE", is the rate at which a seller would receive their "PART" to pay loan balances, closing costs, and themselves.

(PART) $288,300 ÷ **(RATE) .93 = $310,000 whole Sales Price**

Looking at it another way: If we knew the Sales Price was $310,000, and the Broker charged 7%, we would multiply the "Whole" Sales Price by 93% "Rate", (Whole) X (Seller's Rate) to determine the "seller's part" or how much was left to pay everyone else. It doesn't matter what the seller used their "part" for. We simply need to start with what we already know, i.e. that $288,300 was equal to 93% of the sales price. If we know what 93% of it was, we can figure out what 100% of it was, ...100% is the "whole".

ANSWER QUESTION #10:

The couple's monthly payment will be $74.25 lower each month:

At 7.5%: 75 x 6.99 = $524.25

At 6%: 75 x 6.00 = $450.00

$524.25 - $450 = $74.25 lower each month

ANSWER QUESTION #11: This a GRM (Gross Rent Multiplier) question. "Gross" means the total or "gross" rent, and not including or accounting for expenses. So it's sales price divided by the gross monthly rent. GIM (Gross Income Multiplier) is used for 5+ unit properties and uses annual rent figures. Make sure to keep GRM monthly and GIM annual.

$1,250 monthly rent X 3 units =$3,750 to get "Gross." The operating expenses are a distractor.

Sales price / gross rent = GRM
$360,000 / $3,750 = GRM of 96