Applications

> *There's no place like home.*
>
> —Judy Garland, American actress, as Dorothy in *The Wizard of Oz*

1. Interpret the quote in the context of your own home. See margin.

2. The Smiths took out a $130,000, 30-year mortgage at an APR of 3.4%. The monthly payment was $576.53. What will be their total interest charges after 30 years? $77,550.80

3. If you borrow $220,000 at an APR of 3.5 for 25 years, you will pay $1,101.37 per month. If you borrow the same amount at the same APR for 30 years, you will pay $987.90 per month.
   a. What is the total interest paid on the 25-year mortgage? $330,411
   b. What is the total interest paid on the 30-year mortgage? $355,644
   c. How much more interest is paid on the 30-year mortgage? Round to the nearest dollar. $25,233
   d. If you can afford the difference in monthly payments, you can take out the 25-year mortgage and save all the interest from part c. What is the difference between the monthly payments of the two different mortgages? Round to the nearest dollar. $113

4. United Bank offers a 15-year mortgage at an APR of 4.2%. Capitol Bank offers a 25-year mortgage at an APR of 4.5%. Marcy wants to borrow $120,000.
   a. What would the monthly payment be from United Bank? $899.70
   b. What would the total interest be from United Bank? Round to the nearest ten dollars. $41,950
   c. What would the monthly payment be from Capitol Bank? $667
   d. What would the total interest be from Capitol Bank? Round to the nearest ten dollars. $80,100
   e. Which bank has the lower total interest, and by how much? United; $38,150
   f. What is the difference in the monthly payments? $232.70
   g. How many years of payments do you avoid if you decide to take out the shorter mortgage? 10 years

5. The assessed value of the Weber family's house is $186,000. The annual property tax rate is 2.15% of assessed value. What is the property tax on the Webers' home? $3,999

6. The monthly payment on a mortgage with a principal of p dollars is m dollars. The mortgage is taken out for y years. Express the interest I as a function of p, m, and y. $I = 12my - p$

7. The market value of Christine and Gene's home is $275,000. The assessed value is $230,000. The annual property tax rate is $17.50 per $1,000 of assessed value.
   a. What is the property tax on their home? $4,025
   b. How much do they pay monthly toward property taxes? Round your answer to the nearest cent. $335.42

8. Jim is taking out a $135,000 mortgage. His bank offers him an APR of 3.32%. He wants to compare monthly payments on a 20- and a 30-year mortgage. Find, to the nearest dollar, the difference in the monthly payments for these two loans. $177.79

9. The Joseph family took out a $175,000, 25-year mortgage at an APR of 4%. The assessed value of their house is $9,000. The annual property tax rate is 97.22% of assessed value. What is the annual property tax? $8,749.80

10. The Jordans are considering buying a house with a market value of $250,000. The assessed value of the house is a dollars. The annual property tax is $2.45 per $100 of assessed value. What is the property tax on this house? $2.45\left(\dfrac{a}{100}\right)$

11. Allison has a mortgage with North End Bank. The bank requires that she pay her homeowner's insurance, property taxes, and mortgage in one monthly payment. Her monthly mortgage payment is $1,390, her semi-annual property tax bill is $3,222, and her quarterly homeowner's insurance bill is $282. How much does Allison pay North End Bank each month? $2,021

12. Miguel and Cara had an adjusted gross income of a dollars. Miguel just got a $3,000 raise and Cara got a $1,500 raise. They are considering moving to a new house with monthly mortgage payments of m dollars, annual property taxes of p dollars, and an annual homeowner's premium of h dollars. Express their front-end ratio algebraically. See margin.

13. The Ungers have an adjusted gross income of $117,445. They are looking at a new house that would carry a monthly mortgage payment of $1,877. Their annual property taxes would be $6,780, and their semi-annual homeowner's premium would be $710.
   a. Find their front-end ratio to the nearest percent. 26%
   b. Assume that their credit rating is good. Based on the front-end ratio, would the bank offer them a loan? Explain. See margin.
   c. The Ungers have a monthly car loan of $430, and their average monthly credit card bill is $5,100. Mr. Unger is also paying $1,000 per month in child support from a previous marriage. Compute the back-end ratio to the nearest percent. 93%
   d. If the bank used both the front-end and back-end ratios to decide on mortgage approval, would the Ungers get their mortgage? Explain. See margin.

14. Andy is a single father who wants to purchase a home. His adjusted gross income for the year is a dollars. His monthly mortgage is m dollars, and his annual property tax bill is p dollars. His monthly credit card bill is c dollars, and he has a monthly car loan for d dollars. His quarterly homeowner's bill is h dollars. Express Andy's back-end ratio algebraically. See margin.

15. Ron has a homeowner's insurance policy, which covers theft, with a deductible of d dollars. Two bicycles, worth b dollars each, and some tools, worth t dollars, were stolen from his garage. If the value of the stolen items was greater than the deductible, represent the amount of money the insurance company will pay algebraically. $2b + t - d$

16. Find the monthly payment (before the balloon payment) for a 20-year, interest-only balloon mortgage for $275,000 at an APR of 3.1%. Round to the nearest $10. $710. See margin for explanation.

ANSWERS

12. $\dfrac{m+\dfrac{p}{12}+\dfrac{h}{12}}{\dfrac{(a+4,500)}{12}}$

13b. Yes; because the front-end ratio is less than 28%

13d. No; because 93% > 36%. Based on the total of their monthly expenses, they cannot afford this loan.

14. $\dfrac{m+\dfrac{p}{12}+\dfrac{h}{3}+c+d}{\dfrac{a}{12}}$

16. "The loan balance is not declining for an interest-only balloon loan, so the interest-only monthly payment can be found by multiplying the principal by the *monthly* interest rate, which is the APR divided by 12."

17. Siegell's Locksmith Shop is taking out a mortgage on a new building. It is going to be an interest-only, 12-year balloon mortgage for $350,000. The APR is 3.35%. The last payment will be the balloon payment of the full principal.

a. Find the total interest for the 12-year mortgage. $139,722.92. See margin for explanation.

b. Find the total number of monthly payments, not including the final balloon payment. 143

c. Find the amount of each monthly payment if the payments are interest-only. Round to the nearest cent. $977.08. See margin for explanation.

d. Find the difference between the regular monthly payment and the balloon payment, to the nearest hundred dollars. $349,022.92

e. If the mortgage was not a balloon mortgage, what would be the amount of the monthly payment, rounded to the nearest cent? 349,022.92

18. An interest-only balloon mortgage for a principal of p dollars for 18 years has total interest of t dollars. Express the amount of each monthly payment before the balloon payment algebraically. $\dfrac{t}{215}$

19. Using the table from Example 2, find the assessed value of the house in the classified ad on the left. $4,959.50

New Listing: Cape-Cod style home w/ 2 baths, 700 sq. ft first flr., upstairs 15 × 26 dormer, 12 × 20 garage, gas heat, frpl, basement. Property 1/2 acre plot w/ 5 ×12 shed and tennis court.

$301K

20. Mark and Beth are looking at four different homes. They created this spreadsheet to estimate escrow calculations more easily. They will pay the property tax and homeowner's insurance each month with their mortgage payment. The bank will hold these two amounts in escrow until those bills need to be paid, which is every 6 months. Each line represents data for a different home they are looking at. Mark and Beth input values for the mortgage, property tax, and homeowner's insurance in rows 2–5, columns A, B, and C.

ANSWERS

20.
  c. 594.50
  d. 3,574.44
  e. 861.08
  f. 5,177.28
  g. 873.67
  h. 5,252.93
  i. 772.92
  j. 4,647.17

	A	B	C	D	E
1	Monthly Mortgage	Annual Property Tax	Annual Homeowner's Insurance	Monthly Escrow Payment	Escrow Balance with Interest after Six Months
2	1,435	5,900	1,234	c.	d.
3	1,987	8,766	1,567	e.	f.
4	2,081	8,944	1,540	g.	h.
5	1,873	7,711	1,564	i.	j.

Future Value of a Periodic Deposit

$$B = \dfrac{P\left(\left(1 + \dfrac{r}{n}\right)^{nt} - 1\right)}{\dfrac{r}{n}}$$

where B = balance at the end of the 6 months
P = periodic deposit amount, which is the monthly escrow
r = annual interest rate expressed as a decimal
n = number of times the interest is compounded annually
t = length of the investment in years

a. Write the spreadsheet formula for cell D2 that will compute the escrow balance after 1 month. =B2/12+C2

b. If the monthly escrow payments get 1% interest compounded monthly, Mark and Beth can compute the value of the escrow account in 6 months. Look at this as finding the future value of a periodic deposit. Recall the formula from Section 2-7 shown at the left. Write the spreadsheet formula for cell E2 that will compute the escrow balance after 6 months, with the given interest rate and monthly compounding. =D2((1+0.01/12)^(12*0.5)−1)/(0.01/12)

c. Fill in the missing entries. See margin.