

Applications

Home is a place you grow up wanting to leave, and grow old wanting to get back to.

—John Ed Pearce, journalist

1. What does this quote mean to you when viewed in the context of what you learned in this section? *See margin.*
2. Three years ago, Jerry purchased a co-op. This year his monthly maintenance fee is \$1,397. Twenty percent of this fee is for Jerry's property taxes. How much will Jerry pay this year in property taxes? **\$3,352.80**
3. Last year, Anna paid x dollars per month for a co-op maintenance fee. One-third of this fee was for property taxes. How much property tax did Anna pay last year? **$4x$**
4. Ron has a co-op in Astor Cooperative. The total shares in the cooperative are 40,000 shares. If Ron owns 500 shares, what percentage of the cooperative corporation does he own? **1.25%**
5. The Jacobs family owned a condo in Bethpage Acres. They bought it for \$130,000 6 years ago and sold it last week for \$195,000. Who keeps the profit from the sale? **Jacobs family**
6. Ethel rented an apartment from a landlord in Sullivan County. Her rent was \$1,200 per month until she moved out last week. The new tenants pay \$1,350 per month. Represent the rent increase as a percent, to the nearest tenth of a percent. **12.5%**
7. Linda wants to purchase a Leisure Heights condominium. She will borrow \$100,000 from Dutchess Savings Bank. The bank is presently offering a 30-year fixed-rate mortgage with an APR of 4.1%. Her monthly maintenance fee will be \$310.
 - a. What is the monthly mortgage payment to the nearest cent? **\$483.20**
 - b. What will be her combined monthly payment? **\$793.20**
8. The Basil family has a summer co-op apartment on a beach and pays a monthly mortgage payment of \$1,120 and a monthly maintenance fee of \$800. The Basils get approval from the co-op board of directors to *sublet* their apartment, since they do not plan to use it this summer. This means they will continue to make all the payments, but they will rent the apartment to a tenant for the 3 months they are away. The Basils will charge \$2,300 per month to the tenants.
 - a. What is the total of the 3 months' mortgage payments and maintenance fees? **\$5,760**
 - b. How much rent will the Basils receive? **\$6,900**
 - c. Will the rent cover the monthly fees that the Basils must pay? **Yes**
 - d. What is the difference between the rent the Basils will collect and their monthly payments for the 3 months? **\$1,140**
9. Helene and Vick moved into an apartment and pay \$1,875 rent per month. The landlord told them that the rent has increased 3.28% per year on average. Express the rent y as an exponential function of the number of years they rent the apartment. **$y = 1,875(1.0328)^{x-1}$**

TEACH

Exercises 2 and 3

These exercises should be assigned together. Exercise 2 uses numerical values while Exercise 3 uses variables to determine the expression for the property taxes.

Exercise 8

Discuss both the positives and negatives of subletting before assigning this problem. Students should know that although many owners sublet apartments, some may only do so with the approval of the landlord or co-op/condo board. Without landlord approval, the people who are subletting could legally be asked to vacate the premises.

ANSWERS

1. Many young people can't wait to leave their parents' home and gain independence in a home of their own. When they get older, they may long for "the good old days" and want to recapture the parts of their youth returning to their childhood homes. Which they recall with fond memories.

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Exercise 10

Students should understand that when $x = 1$, the rent should be \$2,700 in both equations since the rent was \$2,700 during the first year.

Make sure that students understand that 10b is asking for a linear rather than exponential equation.

Exercise 12

The base in this exponential equation is 1.062. This can be written as $1 + 0.062$, which is the decimal equivalent of $100\% + 6.2\%$. The percent increase is what is added to 100% in the equation.

| Year | Monthly Rent (\$) |
|------|-------------------|
| 2011 | 2,500 |
| 2012 | 2,590 |
| 2013 | 2,675 |
| 2014 | 2,750 |
| 2015 | 2,850 |
| 2016 | 2,925 |

Exercises 16 and 17

Inform students that the spreadsheets given in Lessons 7-4 and 7-5 can be used to answer these exercises.

10. Andrew and Meghan moved into an apartment in the city and pay \$2,700 rent per month. The landlord told them the rent has increased 11.1% per year on average.
- Express the rent y as an exponential function of x , the number of years they rent the apartment. $y = 2,700(1.111)^{x-1}$
 - Suppose the rent has increased \$200 each year. Express the rent y as a function of the number of years x . $y = 200(x - 1) + 2,700$
 - Graph the functions from parts a and b on the same axes. See Additional Answers.
 - Describe the difference between how the two graphs show the increase in rent. See Additional Answers.
11. Maria borrowed \$120,000 from a bank when she bought her co-op for \$156,000. The price dropped x dollars since she bought it. She now owes the bank \$114,000, which is more than she could sell the co-op for. Write an inequality that expresses the fact that the new, decreased price of her shares is less than what Maria owes the bank. $156,000 - x < 114,000$
12. Monthly rent at Countryside Co-ops has increased annually, modeled by the exponential equation $y = 2,155(1.062)^{x-1}$. What was the percent increase per year? 6.2%
13. The monthly rent for a one-bedroom apartment at North Shore Towers for 6 consecutive years is shown in the table on the left.
- Represent the years using the numbers 11, 12, 13, 14, 15, 16. Draw a scatter plot for the data. See Additional Answers.
 - Find the exponential regression equation that models the rent increases. Round to the nearest thousandth. $y = 1773.934 \cdot 1.032^x$
 - Predict the rent in the year 2027. Round to the nearest dollar. \$4,152
14. The Tensers bought a mobile home for \$89,500. They rent space in a trailer park for \$900 per month. The rent increases 2% per year.
- If they put a down payment of \$10,000 on the trailer, how much must they borrow? \$79,500
 - If they borrow the amount from part a for 15 years at an APR of 6%, what will the monthly payment be to the nearest cent? \$670.87
 - What will be the first monthly payment? final monthly payment?
 - How much will they pay each month for their trailer and the space for the first year? \$670.87; \$670.87
 - What will the space rental be to the nearest cent when they are making their final payment on the trailer? \$1,187.53
15. Joe wants to rent an apartment with an initial monthly rent of \$1,400. He has been told that the landlord raises the rent 1.25% each year. Set up an exponential function that models this situation. Calculate the rent after 12 years. Round to the nearest dollar. $y = 1,400(1.0125)^{x-1}$
If $x =$ years, "after 12 years" means $x = 13$.
In the 13th year, the rent will be \$1,625.
16. Use spreadsheets to compare these situations after 5 years.
- | | |
|---|--|
| Total paid and total paid to the principal for a \$250,000, 20-year mortgage with a 4.75% APR | Total amount paid for a \$2,100 monthly rent that has an annual increase of 1.5% |
| Total paid: \$96,933.60 | Total paid: \$129,837.1 |
| Total principal: \$42,299.71 | |
17. Use spreadsheets to compare these situations after 10 years.
- | | |
|---|---|
| Total paid and total paid to the principal for a \$300,000, 15-year mortgage with a 4.35% APR | Total amount paid for a \$2,600 monthly rent that has an annual increase of 2% after 10 years |
| Total paid: \$272,646 | Total paid: \$341,631.30 |
| Total principal: \$177,681.70 | |