

**REALLY? REALLY!
REVISITED**

Have the students look up weights online of other heavy objects, including an airplane, the space shuttle, a whale, and so on. Comparisons can be made to the Fu Gang Building.

At the beginning of the chapter, you were given the weights of the heaviest buildings ever moved. The Fu Gang Building in China was quoted in metric tones. A metric ton is about 10% heavier than an English Standard ton. Let's try to get a feeling for how much that building really did weigh.

1. How many pounds are in an English Standard ton? **2,000 lb**
2. What do you get when you increase that amount by 10%? **2,200 lb**
3. The answer to Exercise 2 is the approximate number of pounds in a metric ton. If the Fu Gang Building weighed approximately 15,140 metric tons, what is its equivalent weight in pounds? **33,308,000 lb**
4. Assuming that the average weight of an elephant is 9,000 pounds, what was the equivalent weight of the Fu Gang Building in average elephants? **approximately 3,701 average elephants**

Applications

1. A rectangular room measures 18 feet by 25 feet. It is going to be carpeted with carpeting that sells for \$8.45 per square foot.
 - a. What is the area of the room in square feet? **450 sq ft**
 - b. If the room is drawn to a scale of $\frac{1}{4}$ inch represents 1 foot, give the dimensions of the room in inches on the scale drawing. **$4\frac{1}{2}$ by $6\frac{1}{4}$**
 - c. This room is well-insulated and on the south side of the house. It has an 8-foot-high ceiling. How large an air conditioner would this room require? Round to the nearest thousand BTUs. **11,000 BTUs**
2. Ricky took out a \$268,000, 30-year mortgage at an APR of 6.34%.
 - a. What is the monthly payment to the nearest cent? **\$1,665.84**
 - b. What will be his total interest charges after 30 years, to the nearest thousand dollars? **\$332,000**
3. Adam is taking out a \$197,000 mortgage. His bank offers him an APR of 7.45%. He wants to compare monthly payments on a 20- and a 30-year loan. Find, to the nearest ten dollars, the difference in the monthly payments for these two loans. **\$210**
4. Eduardo owns a condominium. This year his monthly maintenance fee is m dollars. Twenty-seven percent of this fee pays for Eduardo's property taxes, and 11% pays for the mortgage on the entire development. Both of these expenses are tax-deductible. Express the amount that is tax-deductible algebraically. **$0.38m$**
5. A gazebo in the shape of a regular decagon (10 sides) has side length s and apothem a . Express the area of the floor A , algebraically. **$A = 5as$**

6. Brianna just signed a lease on a rental apartment. The current rent is \$1,330 per month, and she estimates a 6% increase each year. Use her estimate to predict the sum of the next five years' worth of monthly rental expenses. Round to the nearest thousand dollars. **\$90,000**
7. The Bricely Family borrowed \$176,000 from Glen Bank several years ago when they bought their co-op for \$246,000. The price dropped d dollars since they bought it. After making years of payments and paying some of the principal, they now owe the bank b dollars, which is more than the price for which they could sell the co-op.
- Write an inequality that expresses the fact that the new, decreased price of the co-op is less than what the Bricelys owe the bank. $246,000 - d < b$
 - Express the amount of extra money the Bricelys need to raise to pay the bank if they wanted to sell their co-op for d dollars less than the price for which they could sell the co-op. $b - (246,000 - d)$
8. The Maxwell family took out a \$275,000, 20-year mortgage at an APR of 6.1%. The assessed value of their house is \$9,400. The annual property tax rate is 90.82% of assessed value. What is the annual property tax? **\$8,537.08**
9. The market value of a home is \$311,000. The assessed value is x dollars. The annual property tax rate is a dollars per \$1,000 of assessed value. Express the semi-annual property tax bill algebraically. **See margin.**
10. Katherine and Alex had an adjusted gross income of g dollars. Katherine just got a \$2,000 raise. They are considering moving to a new house with monthly mortgage payment m dollars, semiannual property taxes s dollars, and quarterly homeowner's premium q dollars. Express their front-end ratio algebraically. **See margin.**
11. The Xiomas have an adjusted gross income of \$137,865. They are looking at a new house that would have a monthly mortgage payment of \$1,687. Their annual property taxes would be \$7,550 and their semi-annual homeowner's premium would be \$835.
- Find their front-end ratio to the nearest percent. **21%**
 - Assume that their credit rating is good. Based on the front-end ratio, would the bank offer them a loan? Explain. **See margin.**
 - The Xiomas have a \$344 per month car loan, and their average monthly credit card bill is \$420. Compute the back-end ratio to the nearest percent. **28%**
 - Based on the back-end ratio, would the bank offer them a loan? Explain. **Yes, the back-end ratio is less than 36%.**
12. Lexi moved into an apartment in the suburbs and pays \$1,975 rent per month. The landlord told her that the rent has increased 3.6% per year on average. Express the rent y as an exponential function of x , the number of years she rents the apartment. $y = 1,975(1.036)^{x-1}$
13. Harley built a concrete patio in her backyard. It is a free-form shape and she needs to find the area of it for property tax purposes.
- She takes a diagram of the patio and places it inside a 30-ft by 25-ft rectangle. What is the area of the rectangle? **750 sq ft**
 - She then has a graphing calculator generate 20,000 random points inside the rectangle. She finds that 12,451 of these points landed in the patio outline. What percent of the points landed in the patio? Round to the nearest percent. **62%**
 - What is the area of the patio, to the nearest square foot? **465 sq ft**

ANSWERS

$$9. \frac{ax}{1,000}$$

$$10. \frac{m + \frac{s}{6} + \frac{q}{3}}{(g + 2,000)}$$

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- 11b. Yes; because the front-end ratio is less than 28%.

14. Ivana Chase has a gross bimonthly income of \$2,900. She pays 16% in federal and state taxes, puts aside 12% of her income to pay off her school loan, and puts 5% of her income aside for savings. She is considering an apartment that will rent for \$1,700 per month.
- Does this monthly rental fee fall within the recommended 25–30% housing expense range? **yes**
 - Based upon her expenses, can she make the monthly payments? How much will remain after she pays for the rent and other expenses? **yes, \$2,186**
15. The square footage and monthly rental of 15 similar two-bedroom apartments in Martha's Cove yield the following linear regression formula: $y = 1.137x + 598.98$ where x represents the square footage of the apartment and y represents the monthly rental price.
- Use the formula to determine the monthly rent for an apartment that has 1800 square feet. **\$2,645.58**
 - Using the recommendation that you should spend no more than 28% of your monthly gross income on housing, can Stephanie afford this rental if she makes \$9,800 per month? Explain. **Yes; she can spend up to \$2,744 to be within the recommendation.**
16. Johnny took out a \$500,000 30-year mortgage with an APR of 6.95%. The first month he made an extra payment of \$1,000. What was his balance at the end of that first month? **\$498,586.09**
17. James rents an apartment with an initial monthly rent of \$1,600. He was told that the rent goes up 1.75% each year. Write an exponential function that models this situation to calculate the rent after 15 years. Round the monthly rent to the nearest dollar. **$y = 1,600(1.075)^{x-1}$; \$2,076**
18. Elizabeth is moving from a one bedroom apartment in one city to a similar apartment in another city. She has been quoted a flat fee for the truck rental and has two estimates for wages of the movers she will hire depending on her needs and when she moves.

Weekday Move	Weekend Move
5 hours of loading and unloading services	4 hours of loading and unloading services
4 hours of packing and unpacking services	5 hours of packing and unpacking services
\$730 total cost	\$710 total cost

Luke's Moving Company charges a set hourly moving team rate for loading and unloading, and a different set hourly moving team rate for packing and unpacking. Determine the hourly rates. **\$90 for loading/unloading, \$70 for packing/unpacking**

19. Fill in the missing entries in this loan amortization table for a \$220,000 20-year mortgage with an APR of 5.95%. **a. 1,569.81 b. 219,521.02 c. 1,086.07 d. 486.14 e. 217,581.25**

Payment Number	Beginning Balance	Monthly Payment	Towards Interest	Towards Principal	Ending Balance
1	220,000.00	a.	1,090.83	478.98	b.
2	b.	a.	1,088.46	481.35	219,039.67
3	219,039.67	a.	c.	483.74	218,555.94
4	218,555.94	a.	1,083.67	d.	218,069.80
5	218,069.80	a.	1,081.26	488.55	e.

20. Joanne and Matt have been approved for a \$350,000, 15-year mortgage with an APR of 6.25%. Using the mortgage and interest formulas, set up a two-month amortization table with the following headings and complete the table for the first two months. [See additional answers.](#)

Payment Number	Beginning Balance	Monthly Payments	Towards Interest	Towards Principal	Ending Balance
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21. Use the spreadsheets from Lessons 8-4 and 8-5 to compare the following two situations after an 8-year period. [See margin.](#)

total amount paid and total amount paid to principal for a \$250,000, 18-year mortgage with an APR of 6.35%	total amount paid for a \$1,700 monthly rent that has an annual increase of 1.8%
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22. Use the spreadsheets from Lessons 8-4 and 8-5 to compare the following two situations after a 7-year period. [See margin.](#)

total amount paid and total amount paid to principal for a \$370,000, 20-year mortgage with an APR of 7.1%	total amount paid for a \$2,600 monthly rent that has an annual increase of 2%
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23. Michelle took out a \$370,000 30-year adjustable rate mortgage with a 3.8% initial 6-month rate. The amortization table for the initial rate period is shown. After the first 6 months, the rate went up to 4.8%. Calculate the next line of the amortization table. [See margin.](#)

Payment Number	Beginning Balance	Monthly Payment	Towards Interest	Towards Principal	Ending Balance
1	370,000.00	1,724.04	1,171.67	552.38	369,447.62
2	369,447.62	1,724.04	1,169.92	554.12	368,893.50
3	368,893.50	1,724.04	1,168.16	555.88	368,337.62
4	368,337.62	1,724.04	1,166.40	557.64	367,779.98
5	367,779.98	1,724.04	1,164.64	559.41	367,220.57
6	367,220.57	1,724.04	1,162.87	561.18	366,659.40

24. Calculate the missing amounts in the amortization table which shows extra payments toward the principal made each month.

Payment Number	Beginning Balance	Monthly Payment	Towards Interest	Towards Principal	Ending Balance	Extra Payment
1	210,000.00	1,628.13	1,225.00	403.13	a.	100
2	a.	1,628.13	1,222.07	b.	208,890.81	200
3	208,890.81	1,628.13	c.	409.60	208,381.21	100
4	208,381.21	1,628.13	1,215.56	412.57	207,918.64	d.
5	207,918.64	1,628.13	1,212.86	415.27	e.	100

a. 209,496.87 b. 406.06 c. 1,218.53 d. 50 e. 207,403.37

21. 1st situation: ending balance = \$172,446.58
total to principal = \$77,553.42; 2nd situation: \$173,860.19
22. 1st situation: ending balance = \$293,935.51
total to principal = \$76,064.49; 2nd situation: total paid = \$230,553.85
23. 7th month, Beginning Balance: \$366,659.40; Monthly Payment: \$1,923.73; Towards Interest: \$1,466.64; Towards Principal: \$457.10; Ending Balance: \$366,202.30