

Applications

ANSWERS

7c. A graphing tool shows that the coordinates of the intersection point, rounded to the nearest hundredth, are (32.92, 30388.24). This means that after a little less than 33 months, both the expenses-to-date and the car's value are the same. In the region before the intersection point, the expenses are lower than the value of the car. But, the region after the intersection point indicates a period of time that the value of the car is less than what was invested in it.

5a. $y = -3,625x + 43,500$

6f. -\$200; there are none.

6g. \$1,400; yes; \$1,700

1	1 8 9 9
2	0 0 3
3	4 6 6 7 7 8
4	0 1 2
5	5 5 6 8 9 9
6	1 2 2
4	1 = 41

- A local publication charges by the character for automotive ads. Letters, numbers, spaces, and punctuation count as characters. They charge \$34 for the first 100 characters, and \$0.09 for each additional character. If x represents the number of characters, express the cost $c(x)$ of an ad as a piecewise function. Graph the function. *See margin.*
- Classic Car Monthly* charges \$49 for a three-line classified ad. Each additional line costs \$9.50. For an extra \$30, a seller can include a photo. How much would a five-line ad with a photo cost? **\$98**
- A local newspaper charges d dollars for a three-line classified ad. Each additional line costs a dollars. Express the cost of a six-line ad algebraically. $d + 5a$
- The straight line depreciation equation for a car is $y = -2400x + 36,000$.
 - What is the original price of the car? **\$36,000**
 - How much value does the car lose per year? **\$2,400**
 - How many years will it take for the car to totally depreciate? **15 years**
- A car is originally worth \$43,500. It takes 12 years for this car to totally depreciate.
 - Write the straight line depreciation equation that models this situation.
 - How long will it take for the car to be worth one-quarter of its original price?
 - How long will it take for the car to be worth \$20,000? Round your answer to the nearest tenth of a year. **6.5 years**
- Prices for used stainless-steel side trim for a 1957 Chevrolet convertible are \$350, \$350, \$390, \$400, \$500, \$500, \$500, \$600, \$650, \$725, \$800, \$850, \$900, and \$1,700. The prices vary depending on condition.
 - Find the mean of the trim prices to the nearest dollar. **\$658**
 - Find the median of the trim prices. **\$550**
 - Find the mode of the trim prices. **\$500**
 - Find the four quartiles for these data. $Q_1 = \$400$; $Q_2 = \$550$; $Q_3 = \$800$; $Q_4 = \$1,700$
 - Find the interquartile range for these data. **\$400**
 - Find the boundary for the lower outliers. Are there any lower outliers?
 - Find the boundary for the upper outliers. Are there any upper outliers?
 - Draw a modified box-and-whisker plot. *See additional answers.*
- Kathy purchased a new car for \$37,800. From her research she has determined that it straight line depreciates over 14 years. She made a \$7,000 down payment and pays \$710 per month for her car loan.
 - Create an expense and depreciation function where x represents the number of months. *Depreciation: $y = -225x + 37,800$; Expense: $y = 710x + 7,000$*
 - Graph these functions on the same axes. *See additional answers.*
 - Interpret the region before, at, and after the intersection point in the context of this situation. *See margin.*
- Grahamsville High School recently polled its teachers to see how many miles they drive to work each day. At the left is a stem-and-leaf plot of the results.
 - How many teachers were polled? **25**
 - Find the mean to the nearest mile. **40**
 - Find the median. **38**
 - Find the mode(s). **19, 20, 36, 37, 55, 59, 62**
 - Find the range. **51**
 - Find the four quartiles. $Q_1 = 21.5$; $Q_2 = 38$; $Q_3 = 57$; $Q_4 = 62$
 - What percent of the teachers travel more than 38 miles to work? **48%**
 - Find the interquartile range. **35.5**
 - What percent of the teachers travel from 38 to 57 miles to work? **28%**

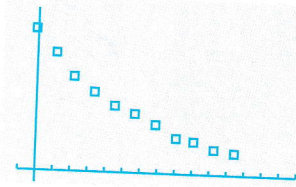
9. Stewart has \$25,000 worth of property damage insurance and a \$1,000 deductible collision insurance policy. He crashed into a fence when his brakes failed and did \$7,000 worth of damage to the fence. The crash caused \$3,600 in damages to his car.

- Which insurance covers the damage to the fence? **Property damage**
- How much will the insurance company pay for the fence? **\$7,000**
- Stewart's car still was drivable after the accident. On the way home from the accident, he hit an empty school bus and did \$20,000 worth of damage to the bus and \$2,100 worth of damage to his car. How much will the insurance company pay for the damage to the bus? **\$20,000**
- Which insurance covers the damage to Stewart's car? **collision**
- How much will the insurance company pay for the damage to the car? **\$3,700**

10. The historical prices of a car with the same make, model, and features are recorded for a period of 10 years in the table at the right.

- Construct a scatter plot for the data. **See margin.**
- Determine the exponential depreciation formula that models this data. Round all numbers to the nearest hundredth. **$y = 31,985.36(0.91)^x$**
- Determine the depreciation rate to the nearest percent. **Approx. 9%**
- Use the model equation to predict the value of this car after 66 months. Round to the nearest thousand dollars. **Approx. \$19,000**

10a.



Historical Prices	
Age	Value (\$)
0	32,000
1	29,100
2	26,500
3	24,120
4	21,950
5	20,000
6	18,100
7	16,500
8	15,000
9	13,700
10	12,500

11. Gina has 250/500/50 liability insurance and \$50,000 PIP insurance. One afternoon, she changed lanes too quickly, hit the metal guard rail, and then hit a tour bus. Four people are seriously hurt and sue her. Twenty others have minor injuries. Gina's boyfriend, who was in her car, was also hurt.

- The guard rail will cost \$2,000 to replace. Gina also did \$9,700 worth of damage to the bus. What insurance will cover this, and how much will the company pay? **Property damage; \$11,700**
- The bus driver severed his hand and cannot drive a bus again. He sues for \$2,500,000 and is awarded \$1,750,000 in court. What type of insurance covers this? How much will the insurance company pay? **\$250,000 under BI**
- The bus driver (from part b) had medical bills totaling \$90,000 from an operation after the accident. What type of insurance covers this, and how much will the insurance company pay? **\$50,000 under PIP**
- Gina's boyfriend requires \$19,000 worth of medical attention. What insurance covers this, and how much will the company pay? **\$19,000 under PIP**

12. Jerome just purchased a 4-year-old car for \$12,000. He was told that this make and model depreciates exponentially at a rate of 5.8% per year. What was the original price to the nearest hundred dollars? **\$15,200**

13. The following two-way table displays information about favorite sports cars that resulted from a survey given to all students at Shore High School.

	Corvette (C)	Porsche (P)	Ferrari (F)	Total
Boys (B)	90	60	120	270
Girls (G)	110	141	79	330
Total	200	201	199	600

- Find $P(B)$, $P(C)$, $P(B|C)$ and explain whether or not events B and C are independent. **See margin.**
- What is the probability that a randomly selected student from this school is a boy?
- What is the probability that a randomly selected student from this school prefers Corvettes, given that the student is a girl?

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Exercise 13a.

$P(B) = 9/20$; $P(C) = 1/3$; $P(B|C) = 9/20$. They are independent, since $P(B) = P(B|C)$.

$$\frac{270}{600} = \frac{9}{20}$$

$$\frac{1}{3}$$

14. Using yearly car values, a graphing calculator has calculated the following exponential regression equation: $y = ab^x$, $a = 28,158.50$, $b = 0.815$.
- What is the rate of depreciation for this car? **18.5%**
 - How much is this car worth to the nearest dollar after 6 years? **\$8,252**
 - How much is this car worth to the nearest hundred dollars after 39 months? **\$14,500**
 - How much is this car worth after y years? **$\$28,158.50(0.815)^y$**
15. Jonathan's car gets approximately 25 miles per gallon. He is planning a 980-mile trip. About how many gallons of gas will his car use for the trip? At an average price of \$2.50 per gallon, how much should Jonathan expect to spend for gas? Round to the nearest ten dollars. **39.2 gallons; \$100**
16. Ann's car gets about 12 kilometers per liter of gas. She is planning a 2,100-kilometer trip. To the nearest liter, how many liters of gas should Ann plan to buy? At an average price of \$0.71 per liter, how much should Ann expect to spend for gas? **175 liters; \$124.25**
17. Max is driving 42 miles per hour. A dog runs into the street and Max reacts in about three-quarters of a second. What is his approximate reaction distance? **42 feet**
18. Tricia is driving 64 miles per hour on an interstate highway. She must make a quick stop because there is an emergency vehicle ahead.
- What is her approximate reaction distance? Round to the nearest foot. **64 feet**
 - What is her approximate braking distance? Round to the nearest foot. **204.8 feet**
 - About how many feet does the car travel from the time she starts to switch pedals until the car has completely stopped, or her total stopping distance? **268.8 feet**
19. Marlena is driving on an interstate at 65 km/h. She sees a traffic jam about 30 meters ahead and needs to bring her car to a complete stop before she reaches that point. Her reaction time is approximately $\frac{3}{4}$ of a second. Is she far enough away from the traffic jam to safely bring the car to a complete stop? Explain. **See margin.**
20. Richie was driving on an asphalt road that had a 40 mi/h speed limit. A bicyclist veered into his lane, causing him to slam on his brakes. His tires left three skid marks of 69 ft, 70 ft, and 74 ft. The road had a drag factor of 0.95. His brakes were operating at 98% efficiency. The police gave Richie a ticket for speeding. Richie insisted that he was driving under the speed limit. Who is correct? Explain. **See margin.**
21. A car was traveling at 52 mi/h before it enters into a skid. It was determined that the drag factor of the road surface is 1.05, and the braking efficiency is 80%. How long might the average skid mark be to the nearest tenth of a foot for this situation? **107.3 feet**
22. A reconstructionist took measurements from yaw marks left at the scene of an accident. Using a 46-ft chord, the middle ordinate measured approximately 6 ft. The drag factor for the road surface was 0.95. Determine the radius of the yaw mark to the nearest tenth of a foot. Determine the minimum speed when the skid occurred to the nearest tenth of a mile. **47.1 feet; 25.9 mi/h**

ANSWERS

19. She does not have enough room to stop. Marlena's total stopping distance is 37.85 meters, which is more than the distance to the traffic jam.
20. The police were correct, since according to the formula, Richie's minimum skid speed was approximately 44.53 miles per hour.

23. A car vehicle price history for a certain make and model contains the following list of yearly price values: \$30,000 \$28,500 \$27,075 \$25,721.25. The original price of the car was \$30,000. It exponentially depreciated to \$28,500 after 1 year and continued depreciating by the same percentage each year thereafter. What will the value of the car be after 7 years? **\$20,950.12**
24. Five years ago, a certain make and model of a car now considered to be a classic had a selling price of \$26,000. Examine this geometric sequence representing the yearly appreciation in the price of the car since then: \$26,000 \$31,200 \$37,440 \$44,928 \$53,913.60 \$64,696.32. If this continues the same way, what would you expect to pay for this classic car 5 years from now? **\$160,985.15**
25. Cargo is tied with rope on the roof of a 4.5-foot-tall car. The car is traveling down a road at 42 mph and hits a concrete barrier. The rope snaps, allowing the cargo to propel forward. Use the equations $y = -16.1t^2 + 4.75$ and $y = -0.0042x^2 + 4.75$ where y represents height in feet, x represents horizontal distance in feet, and t represents time in seconds, to find the time it takes for the cargo to hit the ground and the horizontal distance it travels. **0.54; 33.6 feet**
26. A car is traveling at 68 km/h. Cargo is strapped to the roof at a height of 1.6 m. The car hits a concrete barrier, and the cargo is horizontally ejected off the roof. Use these two equations to determine how long it takes for the cargo to hit the ground and how far it travels in the horizontal direction. $y = -4.9t^2 + 1.6$ and $y = -0.0136x^2 + 1.6$ where y represents the height in meters, x represents the horizontal distance in meters, and t represents the time in seconds. **0.57; 10.85 meters**