

13. $\frac{y}{-5} > \frac{3}{2}$

14. $\frac{x}{-4} < \frac{5}{6}$

15. $2u + 4 = 5u + 1 - 7u$

16. $-3y + 9 + y = 13 - 8y$

B

17. $10x + 25(x - 3) = 275$

18. $-3(4 - x) = 5 - (x + 1)$

19. $3 - y \leq 4(y - 3)$

20. $x - 2 \geq 2(x - 5)$

21. $\frac{x}{5} - \frac{x}{6} = \frac{6}{5}$

22. $\frac{y}{4} - \frac{y}{3} = \frac{1}{2}$

23. $\frac{m}{5} - 3 < \frac{3}{5} - \frac{m}{2}$

24. $\frac{u}{2} - \frac{2}{3} < \frac{u}{3} + 2$

Solve Problems 25–28 and graph.

25. $2 \leq 3x - 7 < 14$

26. $-4 \leq 5x + 6 < 21$

27. $-4 \leq \frac{2}{3}C + 32 \leq 68$

28. $-1 \leq \frac{2}{3}t + 5 \leq 11$

C

Solve Problems 29–34 for the indicated variable.

29. $3x - 4y = 12$; for y

30. $y = -\frac{2}{3}x + 8$; for x

31. $Ax + By = C$; for y ($B \neq 0$)

32. $y = mx + b$; for m

33. $F = \frac{9}{5}C + 32$; for C

34. $C = \frac{5}{9}(F - 32)$; for F

Solve Problems 35 and 36 and graph.

35. $-3 \leq 4 - 7x < 18$

36. $-10 \leq 8 - 3u \leq -6$

37. What can be said about the signs of the numbers a and b in each case?

(A) $ab > 0$

(B) $ab < 0$

(C) $\frac{a}{b} > 0$

(D) $\frac{a}{b} < 0$

38. What can be said about the signs of the numbers a , b , and c in each case?

(A) $abc > 0$

(B) $\frac{ab}{c} < 0$

(C) $\frac{a}{bc} > 0$

(D) $\frac{a^2}{bc} < 0$

39. If both a and b are positive numbers and b/a is greater than 1, then is $a - b$ positive or negative?40. If both a and b are negative numbers and b/a is greater than 1, then is $a - b$ positive or negative?

In Problems 41–46, discuss the validity of each statement. If the statement is true, explain why. If not, give a counterexample.

41. If the intersection of two open intervals is nonempty, then their intersection is an open interval.

42. If the intersection of two closed intervals is nonempty, then their intersection is a closed interval.

43. The union of any two open intervals is an open interval.

44. The union of any two closed intervals is a closed interval.

45. If the intersection of two open intervals is nonempty, then their union is an open interval.

46. If the intersection of two closed intervals is nonempty, then their union is a closed interval.

Applications47. **Ticket sales.** A rock concert brought in \$432,500 on the sale of 9,500 tickets. If the tickets sold for \$35 and \$55 each, how many of each type of ticket were sold?48. **Parking meter coins.** An all-day parking meter takes only dimes and quarters. If it contains 100 coins with a total value of \$14.50, how many of each type of coin are in the meter?49. **IRA.** You have \$500,000 in an IRA (Individual Retirement Account) at the time you retire. You have the option of investing this money in two funds: Fund A pays 5.2% annually and Fund B pays 7.7% annually. How should you divide your money between Fund A and Fund B to produce an annual interest income of \$34,000?50. **IRA.** Refer to Problem 49. How should you divide your money between Fund A and Fund B to produce an annual interest income of \$30,000?51. **Car prices.** If the price change of cars parallels the change in the CPI (see Table 2 in Example 10), what would a car sell for (to the nearest dollar) in 2005 if a comparable model sold for \$10,000 in 1990?52. **Home values.** If the price change in houses parallels the CPI (see Table 2 in Example 10), what would a house valued at \$200,000 in 2005 be valued at (to the nearest dollar) in 1960?53. **Retail and wholesale prices.** Retail prices in a department store are obtained by marking up the wholesale price by 40%. That is, retail price is obtained by adding 40% of the wholesale price to the wholesale price.

(A) What is the retail price of a suit if the wholesale price is \$300?

(B) What is the wholesale price of a pair of jeans if the retail price is \$77?

54. **Retail and sale prices.** Sale prices in a department store are obtained by marking down the retail price by 15%. That is, sale price is obtained by subtracting 15% of the retail price from the retail price.

(A) What is the sale price of a hat that has a retail price of \$60?

(B) What is the retail price of a dress that has a sale price of \$136?

55. **Equipment rental.** A golf course charges \$52 for a round of golf using a set of their clubs, and \$44 if you have your own clubs. If you buy a set of clubs for \$270, how many rounds must you play to recover the cost of the clubs?56. **Equipment rental.** The local supermarket rents carpet cleaners for \$20 a day. These cleaners use shampoo in a special cartridge that sells for \$16 and is available only from the supermarket. A home carpet cleaner can be purchased for \$300. Shampoo for the home cleaner is readily available for \$9 a bottle. Past experience has shown that it takes two shampoo cartridges to clean the 10-foot-by-12-foot carpet

in your living room with the rented cleaner. Cleaning the same area with the home cleaner will consume three bottles of shampoo. If you buy the home cleaner, how many times must you clean the living-room carpet to make buying cheaper than renting?

57. **Sales commissions.** One employee of a computer store is paid a base salary of \$2,000 a month plus an 8% commission on all sales over \$7,000 during the month. How much must the employee sell in one month to earn a total of \$4,000 for the month?

58. **Sales commissions.** A second employee of the computer store in Problem 57 is paid a base salary of \$3,000 a month plus a 5% commission on all sales during the month.

(A) How much must this employee sell in one month to earn a total of \$4,000 for the month?

(B) Determine the sales level at which both employees receive the same monthly income.

(C) If employees can select either of these payment methods, how would you advise an employee to make this selection?

59. **Break-even analysis.** A publisher for a promising new novel figures fixed costs (overhead, advances, promotion, copy editing, typesetting) at \$55,000, and variable costs (printing, paper, binding, shipping) at \$1.60 for each book produced. If the book is sold to distributors for \$11 each, how many must be produced and sold for the publisher to break even?

60. **Break-even analysis.** The publisher of a new book figures fixed costs at \$92,000 and variable costs at \$2.10 for each book produced. If the book is sold to distributors for \$15 each, how many must be sold for the publisher to break even?

61. **Break-even analysis.** The publisher in Problem 59 finds that rising prices for paper increase the variable costs to \$2.10 per book.

(A) Discuss possible strategies the company might use to deal with this increase in costs.

(B) If the company continues to sell the books for \$11, how many books must they sell now to make a profit?

(C) If the company wants to start making a profit at the same production level as before the cost increase, how much should they sell the book for now?

62. **Break-even analysis.** The publisher in Problem 60 finds that rising prices for paper increase the variable costs to \$2.70 per book.

(A) Discuss possible strategies the company might use to deal with this increase in costs.

(B) If the company continues to sell the books for \$15, how many books must they sell now to make a profit?

(C) If the company wants to start making a profit at the same production level as before the cost increase, how much should they sell the book for now?

63. **Wildlife management.** A naturalist estimated the total number of rainbow trout in a certain lake using the capture-mark-recapture technique. He netted, marked, and released 200 rainbow trout. A week later, allowing for thorough mixing, he again netted 200 trout, and found 8 marked ones among them. Assuming that the proportion of marked

fish in the second sample was the same as the proportion of all marked fish in the total population, estimate the number of rainbow trout in the lake.

64. **Temperature conversion.** If the temperature for a 24-hour period at an Antarctic station ranged between -49°F and 14°F (that is, $-49 \leq F \leq 14$), what was the range in degrees Celsius? [Note: $F = \frac{9}{5}C + 32$.]

65. **Psychology.** The IQ (intelligence quotient) is found by dividing the mental age (MA), as indicated on standard tests, by the chronological age (CA) and multiplying by 100. For example, if a child has a mental age of 12 and a chronological age of 8, the calculated IQ is 150. If a 9-year-old girl has an IQ of 140, compute her mental age.

66. **Psychology.** Refer to Problem 65. If the IQ of a group of 12-year-old children varies between 80 and 140, what is the range of their mental ages?

67. **Anthropology.** In their study of genetic groupings, anthropologists use a ratio called the **cephalic index**. This is the ratio of the breadth B of the head to its length L (looking down from above) expressed as a percentage. A study of the Gurung community of Nepal published in the *Kathmandu University Medical Journal* in 2005 found that the average head length of males was 18 cm, and their head breadths varied between 12 and 18 cm. Find the range of the cephalic index for males. Round endpoints to one decimal place.

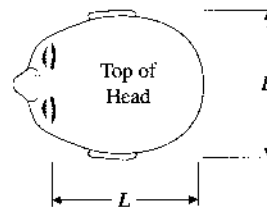


Figure for 67–68

68. **Anthropology.** Refer to Problem 67. The same study found that the average head length of females was 17.4 cm, and their head breadths varied between 15 and 20 cm. Find the range of the cephalic index for females. Round endpoints to one decimal place.

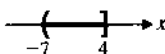
Answers to Matched Problems

1. $x = 4$

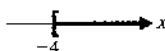
2. $x = 2$

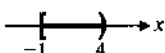
3. (A) $L = \frac{S - 2WH}{2W + 2H}$ (B) $H = \frac{S - 2LW}{2L + 2W}$

4. (A) $<$ (B) $<$ (C) $>$

5. (A) $-7 < x \leq 4$; 

(B) $(-\infty, 3)$ 

6. $x \geq -4$ or $[-4, \infty)$ 

7. $-1 \leq x < 4$ or $[-1, 4)$ 

8. \$26,000

9. 7,500 DVDs

10. \$27,547