17. 9 **19.** -12 **21.** (7, 0) **23.** (4, 4) **25.** (4, 2) **27.** (6, 8); 10 **29. a.** (18, 18), (9, 9), (6, 6) **b.** (11, 12), (8, 9) **31.** $|(ka, kb)| = \sqrt{(ka)^2 + (kb)^2} = \sqrt{k^2(a^2 + b^2)} = |k|\sqrt{a^2 + b^2} = |k| \cdot |(a, b)|$ **33. a.** 1. Def. of vector sum 2. Subst. 3. $k[(a, b) + (c, d)] = k(a, b) + k(c, d)$ 4. Def. of vector sum **b.** Thm. 5-11

Mixed Review, Page 543

1. -2 **2.** 6; 6 **3.** 16 **4.** $a\sqrt{3}$ **5.** 120 **6.** $2x$; $x\sqrt{3}$ **7.** 45 **8.** $(-3, 5)$ **9.** 25 **10.** 18 **11. a.** $(DE)^2 + (EF)^2 = 25 + 100 = 125$; $(DF)^2 = 121 + 4 = 125$ **b.** Slope of $\overline{DE}$ · slope of $\overline{EF} = -\frac{4}{3} \cdot \frac{3}{4} = -1$ **12. a.** $\frac{2}{3}$ **b.** $\frac{1}{4}$

Written Exercises, Pages 545–547

1. (3, 3) **3.** (0, -2) **5.** (1.9, 0.4) **7.** $2\sqrt{41}$; $\frac{-5}{4}$; $(-1, -3)$ **9.** 17; $-\frac{15}{8}$; $\left(-3, \frac{7}{2}\right)$ **11.** (9, 5)

13. 1. The midpt. of $\overline{AB}$ is $M(4, 2)$. Slope of $\overline{AB} = \frac{4 - 0}{8 - 0} = \frac{1}{2}$, slope of $\overline{PM} = \frac{2 - 6}{4 - 2} = -2$; $\frac{1}{2}(-2) = -1$, so $\overline{PM} \perp \overline{AB}$. 2. $PA = 2\sqrt{10} = PB$, so P is on the $\perp$ bis. of $\overline{AB}$. **15.** $\left(-\frac{5}{2}, \frac{1}{2}\right)$, $\left(\frac{11}{2}, \frac{1}{2}\right)$; 8

17. a. $\left(\frac{9}{2}, \frac{9}{2}\right)$ **b.** $\square$ **c.** slope of $\overline{PQ}$ = slope of $\overline{OR} = \frac{3}{7}$; slope of $\overline{PO}$ = slope of $\overline{QR} = 3$ **d.** $PQ = OR = \sqrt{58}$; $PO = QR = 2\sqrt{10}$ **19. a.** $(-3, 4)$ **b.** 5; 5; 5 **c.** Thm. 5-15 **d.** $(x + 3)^2 + (y - 4)^2 = 25$

21. a. $J\left(-\frac{1}{2}, \frac{3}{2}\right)$, $K(3, 6)$, $L\left(\frac{17}{2}, \frac{9}{2}\right)$; $M(5, 0)$ **b.** rhom.; $JK = KL = LM = JM = \frac{\sqrt{130}}{2}$

23. $\left(\frac{5}{8}x_1 + \frac{3}{8}x_2, \frac{5}{8}y_1 + \frac{3}{8}y_2\right)$

Self-Test 1, Page 547

1. a. 2 **b.** (4, 1) **2. a.** 10 **b.** $(4, -3)$ **3. a.** $10\sqrt{2}$ **b.** (3, 2) **4. a.** $\sqrt{29}$ **b.** $\left(-4, \frac{9}{2}\right)$

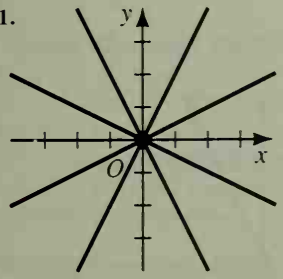
5. $x^2 + y^2 = 81$ **6.** $(x + 1)^2 + (y - 2)^2 = 25$ **7.** $(-2, 3)$; 6 **8.** $\frac{4}{7}$ **9.** $-\frac{3}{5}$ **10.** vertical

11. a. 2 **b.** $-\frac{1}{2}$ **12. a.** $(6, -2)$ **b.** $(-3, -3)$ **c.** (0, 4) **13. a.** $2\sqrt{10}$ **b.** $3\sqrt{2}$ **c.** 4

14. a. $(4, -9)$ **b.** $(22, -9)$ **15.** $(-15, 18)$

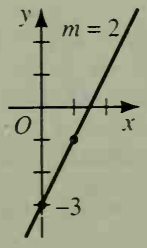
Written Exercises, Pages 550–552

1.



7. -7; -21 **9.** 4; 6 **11.** 4; $\frac{5}{2}$

13.



15. $m = -4$, $b = 0$ **17.** $m = -\frac{2}{3}$, $b = -4$ **19.** $m = -4$, $b = 10$ **21.** $m = \frac{5}{2}$, $b = -5$ **23.** $m = \frac{1}{4}$, $b = -\frac{3}{2}$

25. (1, 2) **27.** (4, 3) **29.** (2, -3) **31. a.** Both have slope -2. **b.** No **c.** There is no sol. **33. a.** 2; $-\frac{1}{2}$ **b.** They are $\perp$; 2 nonvert. lines are $\perp$ iff the prod. of their slopes is -1. **35. b.** $(2, -1)$, $(-1, 5)$, $(-4, -4)$ **c.** $22\frac{1}{2}$ **37.** (3, 4), $(-5, 0)$