

48. Find the equation of the line through the point $(2, -1)$ that
- passes through $(-3, 5)$.
 - is parallel to $2x - 3y = 5$.
 - is perpendicular to $x + 2y = 3$.
 - is perpendicular to the y -axis.
49. Find the equation of the line passing through the intersection of the lines $x + 2y = 1$ and $3x + 2y = 5$ that is parallel to the line $3x - 2y = 4$.
50. A line L is perpendicular to the line $2x + 3y = 6$ and passes through $(-3, 1)$. Where does L cut the y -axis?
51. Find the equation of the perpendicular bisector of the line segment connecting $(3, -2)$ and $(7, 6)$.
52. The center of the circle that circumscribes a triangle is at the intersection of the perpendicular bisectors of the sides (Figure 36). Use this fact to find the center of the circle that goes through the three points $(0, 8)$, $(6, 2)$, and $(12, 14)$.

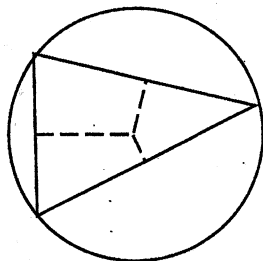


Figure 36

53. Show that the equation of the line with x -intercept a and y -intercept b (both a and b nonzero) can be written in the form

$$\frac{x}{a} + \frac{y}{b} = 1$$

54. Show that the graph of $Ax + Bx + C = 0$ is always a line (provided A and B are not both 0). *Hint:* Consider two cases: (1) $B = 0$ and (2) $B \neq 0$.
55. A line passes through $(3, 2)$ and its nonzero y -intercept is twice its x -intercept. Find the equation of the line.
56. For each k , the equation $2x - y + 4 + k(x + 3y - 6) = 0$ represents a line (why?). One value of k determines a line with slope $\frac{3}{4}$. Where does this line cut the y -axis?

57. The ABC Company makes zeebos, which it sells for \$20 apiece. The material and labor to make a zeebo cost \$16 and the company has fixed yearly costs (utilities, real estate taxes, and so on) of \$8500. Write an expression for the company's profit P in a year in which it makes and sells x zeebos. What is its profit in a year in which it makes only 2000 zeebos?
58. A piece of equipment purchased today for \$80,000 will depreciate linearly to a scrap value of \$2000 after 20 years. Write a formula for its value V after t years.
59. A house purchased on January 1, 1970 for \$60,000 appreciated linearly to a value of \$112,000 on January 1, 1990.
- Write a formula for V , its value t years after purchase.
 - When was the house worth \$69,100?
60. In 1968, Heidi McGoff invested \$5000 in a savings account which yielded 5 percent simple interest for 4 years and 6 percent simple interest after that. Write a formula for A , the accumulated amount after t years if
- $0 < t < 4$
 - $t \geq 4$
61. Find the distance between the parallel lines $12x - 5y = 2$ and $12x - 5y = 7$.
62. Find the formula for the distance between the lines $y = mx + b$ and $y = mx + B$ in terms of m , b , and B .
63. Show that the line through the midpoints of two sides of a triangle is parallel to the third side.
64. Let the three vertices of a triangle lie on a circle with two of them being the ends of a diameter. Show that the triangle is a right triangle. *Hint:* Place the triangle in the coordinate system so two of its vertices are $(-a, 0)$ and $(a, 0)$.
65. Find two points in the plane that are simultaneously equidistant from the lines $y = \pm x$ and the point $(5, 3)$.
66. Using the same axes, sketch the graphs of $x^2 + y^2 = 1$ and $|x| + |y| = 1$ and compute the area of the region between the two graphs.
67. A line through $(4, 4)$ is tangent to the circle $x^2 + y^2 = 4$ at a point P in the fourth quadrant. Find the coordinates of P .