6. Determine an equation for the right bisector of the line segment joining A(3, 6) and B(–1, 2).

7. Verify that the given point lies on the perpendicular bisector of the given line segment.
a) point A(3, 4); line segment BC, with endpoints B(2, 1) and C(6, 5)
b) point P(1, 3); line segment QR, with endpoints Q(–3, 1) and R(3, –1)
c) point K(–2, –4); line segment LM, with endpoints L(0, 2) and M(4, –6)

8. The equation of a circle with centre O(0, 0) is $x^2 + y^2 = 10$. The points C(3, 1) and D(1, –3) are the endpoints of chord CD. EF right bisects chord CD at G. Verify that the centre of the circle lies on the right bisector of chord CD.

9. The vertices of a quadrilateral are A(0, 0), B(2, 3), C(5, 1), and D(3, –2). Verify that the diagonals of ABCD are perpendicular to each other.

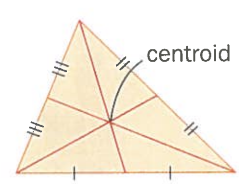
10. Verify that the quadrilateral with vertices O(0, 0), P(3, 5), Q(13, 7), and R(5, 1) is a trapezoid.

11. Verify that the quadrilateral with vertices P(–2, 2), Q(–2, –3), R(–5, –5), and S(–5, 0) is a parallelogram.

12. A triangle has vertices K(–2, 2), L(1, 5), and M(3, –3). Verify that
a) the triangle has a right angle
b) the midpoint of the hypotenuse is the same distance from each vertex

13. Quadrilateral PQRS has vertices P(0, 6), Q(–6, –2), R(2, –4), and S(4, 2). Verify that the quadrilateral formed by joining the midpoints of the sides of PQRS is a parallelogram.

14. $\triangle$ABC has vertices A(3, 4), B(–5, 2), and C(1, –4). Determine an equation for
a) CD, the median from C to AB
b) AE, the altitude from A to BC
c) GH, the right bisector of AC



15. A triangle has vertices X(0, 0), Y(4, 4), and Z(8, –4).
a) Write an equation for each of the three medians.
b) Recall that the **centroid** of a triangle is the point of intersection of the medians of the triangle. Use the equations from part a) to verify that (4, 0) is the centroid of $\triangle$XYZ.

16. $\triangle$AOB has vertices A(4, 4), O(0, 0), and B(8, 0). EF right bisects AB at P. GH right bisects OA at Q. Determine the coordinates of the circumcentre of $\triangle$DEF. AOB

17. $\triangle$POR has vertices P(0, 6), O(0, 0), and R(6, 0). Determine the coordinates of the centroid of $\triangle$POR.

Technology Extension p. 81

1 Length of a Line Segment **1.** names the program; clears the memory; prompts user for x_1-data and reads it into variable P; prompts user for y_1-data and reads it into variable Q; prompts user for x_2-data and reads it into variable R; prompts user for y_2-data and reads it into variable S; assigns the difference R – P to the variable X; assigns the difference S – Q to the variable Y; assigns the square root of the sum of the squares of X and Y to the variable L; prints "LENGTH IS" and prints the value of L. **2. a)** 6.4 **b)** 17.1 **c)** 27.33

2 Midpoint of a Line Segment **1.** Change line 6 to $(R + P)/2 \rightarrow X$. Change line 7 to $(S + Q)/2 \rightarrow Y$. Delete line 8. Change the last line to DISP"MIDPOINT IS". Add lines DISP"X=",X and DISP"Y=",Y. **2. a)** (–1, 6) **b)** (2.5, –3.5) **c)** (0.3, –3.45)

3 Collinear Points **2. a)** collinear **b)** not collinear **3.** Answers may vary. **a)** (7, 6) **b)** (–7, 6)

Review: Equations of Lines pp. 85–87

1 Using the Point-Slope Form

1. a) $2x - y - 1 = 0$ **b)** $5x - y - 18 = 0$ **c)** $3x + y + 12 = 0$ **d)** $4x + y + 9 = 0$ **e)** $x - 2y - 18 = 0$ **f)** $x + 2y + 5 = 0$ **g)** $2x - 2y - 9 = 0$ **h)** $3x - 2y + 7 = 0$ **i)** $3x + 2y + 5 = 0$ **2. a)** $2x + y - 13 = 0$ **b)** $3x + y - 3 = 0$ **c)** $x - 2y - 9 = 0$ **d)** $2x - 5y - 11 = 0$ **e)** $5x - 4y + 22 = 0$ **f)** $4x - 3y + 12 = 0$ **3. a)** $y - 5 = 0$; $x - 4 = 0$ **b)** $y - 2 = 0$; $x + 3 = 0$ **c)** $y + 6 = 0$; $x + 5 = 0$ **d)** $y - 8 = 0$; $2x - 1 = 0$ **e)** $3y + 1 = 0$; $x - 9 = 0$ **f)** $y + 9 = 0$; $x = 0$ **g)** $y = 0$; $x + 1 = 0$ **h)** $y = 0$; $x = 0$

2 Using the Slope and *y*-Intercept Form

1. a) 3, 4 **b)** –4, 6 **c)** 1, 5 **d)** $\frac{1}{2}$, –4 **e)** $-\frac{1}{2}, \frac{4}{3}$ **f)** $\frac{1}{4}$, –1 **g)** $\frac{5}{2}$, –3 **h)** $-\frac{2}{3}$, 0 **i)** –20, 6 **2. a)** 1, 2 **b)** –1, 3 **c)** 2, 5 **d)** –3, 10 **e)** $\frac{1}{2}$, –1 **f)** $-\frac{1}{2}$, 1 **g)** 4, 7 **h)** $-\frac{1}{5}, \frac{13}{5}$ **i)** $\frac{1}{3}, \frac{5}{3}$

3 Parallel and Perpendicular Lines

1. a) $3x - y - 5 = 0$ **b)** $2x - y + 8 = 0$ **c)** $x + 2y + 1 = 0$ **d)** $x - 3y + 24 = 0$ **2. a)** $x - 2y + 8 = 0$ **b)** $3x + y - 2 = 0$ **c)** $2x - y + 2 = 0$ **d)** $x + 2y - 5 = 0$

Section 2.4 pp. 95–99

Practice **1.** PQ and OR have slope $\frac{1}{5}$; OP and RQ have slope $\frac{5}{3}$ **2.** XY has slope $\frac{2}{3}$; XZ has slope $-\frac{3}{2}$; the slopes are negative reciprocals, so XY is perpendicular to XZ **3. a)** Both segments have slope $-\frac{4}{3}$ and so are parallel. **b)** PQ = 5, KM = 10; $PQ = \frac{1}{2}KM$ **4.** Opposite sides are parallel (two have slope 0 and two have slope $-\frac{4}{3}$) and all sides have length 5; so PQRS is a rhombus. **5. a)** KL and NM have slope –1; KN and LM have slope 1. Thus, opposite sides are parallel and adjacent sides are perpendicular. KLMN is a rectangle. **b)** KM and LN both have length $\sqrt{26}$ **6.** $x + y - 5 = 0$ **7. a)** The midpoint of BC is (4, 3). The line containing (4, 3) and A(3, 4) has slope –1. BC has slope 1. Thus, A(3, 4) is on the perpendicular bisector of BC.

b) The midpoint of QR is (0, 0). The line containing (0, 0) and P(1, 3) has slope 3. QR has slope $-\frac{1}{3}$. Thus, P(1, 3) is on the perpendicular bisector of QR. **c)** The midpoint of LM is (2, –2). The line containing (2, –2) and K(–2, –4) has slope $\frac{1}{2}$. LM has slope –2. Thus, K(–2, –4) is on the perpendicular bisector of LM. **8.** The midpoint of CD is (2, –1). The line containing (2, –1) and O(0, 0) has slope $-\frac{1}{2}$. CD has slope 2. Thus, O(0, 0) is on the right bisector of CD. **9.** Slope AC is $\frac{1}{5}$ and slope BD is –5. The slopes are negative reciprocals, so the diagonals AC and BD are perpendicular.

10. The opposite sides PQ and OR both have slope $\frac{1}{5}$ and so are parallel; the other two sides have different slopes, so are not parallel. OPRQ is a trapezoid.

11. PS and QR both have slope $\frac{2}{3}$; RS and QP are both vertical. Thus, opposite sides are parallel and PQRS is a parallelogram. **12. a)** KL has slope 1, KM has slope –1. KL and KM are perpendicular. **b)** The midpoint of LM is a distance of $\sqrt{17}$ from each vertex. **13.** Opposite sides of the quadrilateral are parallel (two sides have slope $\frac{2}{5}$ and two have slope –5) and so the quadrilateral is a parallelogram. **14. a)** $7x + 2y + 1 = 0$ **b)** $x - y + 1 = 0$ **c)** $x + 4y - 2 = 0$ **15. a)** $y = 0$, $x - 4 = 0$, $x + y - 4 = 0$ **b)** All three medians intersect at (4, 0). **16.** (4, 0) **17.** (2, 2)

Applications and Problem Solving **18.** The vertices of the triangle are A(2, 0), B(–4, 3), and C(–1, –6). $AB = AC = \sqrt{45}$; AC has slope 2 and AB has slope $-\frac{1}{2}$