Exercises

A

3. The slopes of lines are given below. For each line, what is the slope of a parallel line?

a) $\frac{4}{5}$ **b)** $-\frac{4}{3}$

c) 3 **d)** 0

4. The slopes of lines are given below. For each line, what is the slope of a perpendicular line?

a) $\frac{7}{6}$ **b)** $-\frac{5}{8}$

c) 9 **d)** -5

5. The slopes of two lines are given. Are the two lines parallel, perpendicular, or neither?

a) 4, 4 **b)** $\frac{1}{6}$, 6

c) $\frac{7}{8}$, $-\frac{7}{8}$ **d)** $\frac{1}{10}$, -10

6. The slopes of lines are given below. What is the slope of a line that is:

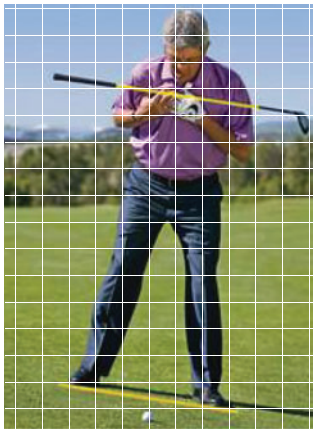
i) parallel to each given line?

ii) perpendicular to each given line?

a) $-\frac{4}{9}$ **b)** 5 **c)** $\frac{7}{3}$ **d)** -4

B

7. This golfer is checking his set-up position by holding his club to his chest and looking to see whether it is parallel to an imaginary line through the tips of his shoes.



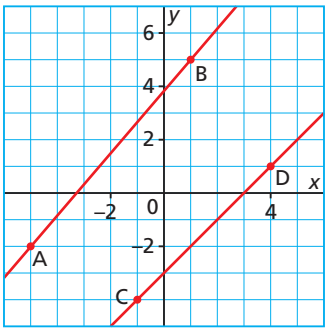
Is this golfer set up correctly? How did you find out?

8. For each grid below:

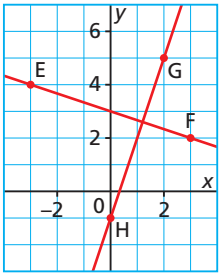
i) Write the coordinates of the 2 labelled points on each line.

ii) Are the two lines parallel, perpendicular, or neither? Justify your answer.

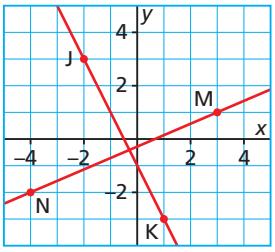
a)



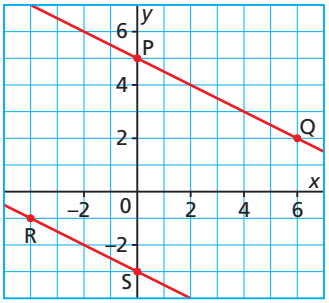
b)



c)



d)



9. The coordinates of the endpoints of segments are given below. Are the two line segments parallel, perpendicular, or neither? Justify your answer.

a) S(−4, −1), T(−1, 5) and U(1, 1), V(5, −1)

b) B(−6, −2), C(−3, 3) and D(2, 0), E(5, 5)

c) N(−6, 2), P(−3, −4) and Q(1, −3), R(3, 4)

d) G(−2, 5), H(4, 1) and J(1, −4), K(7, 0)

10. How are the lines in each pair related? Justify your answer.

a) DE has an x-intercept of 4 and a y-intercept of -6.
FG has an x-intercept of -6 and a y-intercept of 4.

b) HJ has an x-intercept of -2 and a y-intercept of 3.
KM has an x-intercept of -9 and a y-intercept of 6.

11. A line passes through A$(-3, -2)$ and B$(1, 4)$.

a) On a grid, draw line AB and determine its slope.

b) Line CD is parallel to AB. What is the slope of CD?

c) Point C has coordinates $(-1, -1)$. Determine two sets of possible coordinates for D. Why might your answers be different from those of a classmate?

d) Line AE is perpendicular to AB. What is the slope of AE?

e) Determine two sets of possible coordinates for E.

12. A line passes through A$(5, -2)$ and B$(3, 2)$.

a) Draw line AB on a grid and determine its slope.

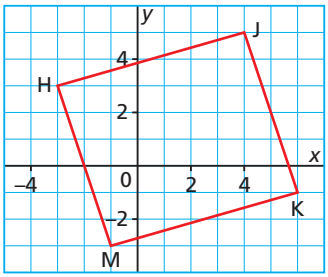
b) Line CD is parallel to AB. What is the slope of CD?

c) Given that Q$(1, -4)$ lies on CD, draw line CD. Determine the coordinates of its x- and y-intercepts.

d) Line EF is perpendicular to AB. What is the slope of EF?

e) Given that R$(-4, -4)$ lies on EF, draw line EF. Determine the coordinates of its x- and y-intercepts.

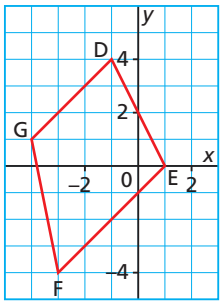
13. HJKM is a quadrilateral.



a) Is HJKM a parallelogram? Justify your answer.

b) Is HJKM a rectangle? Justify your answer.

14. Which type of quadrilateral is DEFG? Justify your answer.



15. QRST is a rectangle with Q$(-2, 4)$ and R$(1, 1)$. Do you have enough information to determine the coordinates of S and T? Explain.

16. The coordinates of the vertices of $\triangle$ABC are A$(-3, 1)$, B$(6, -2)$, and C$(3, 4)$. How can you tell that $\triangle$ABC is a right triangle?

17. The coordinates of the vertices of $\triangle$DEF are D$(-3, -2)$, E$(1, 4)$, and F$(4, 2)$. Is $\triangle$DEF a right triangle? Justify your answer.

18. Draw a triangle on a grid.

a) Determine the slope of each side of the triangle.

b) Join the midpoints of the sides. Determine the slope of each new line segment formed.

c) What relationship do you notice between the slopes in parts a and b?

19. ABCD is a parallelogram. Three vertices have coordinates A(−4, 3), B(2, 4), and C(4, 0).
a) Is ABCD a rectangle? Justify your answer.
b) Determine the coordinates of D. Explain your answer.
c) What other strategy could you use to determine the coordinates of D? Explain.

20. The coordinates of two of the vertices of △RST are R(−3, 4) and S(0, −2).
Determine possible coordinates for T so that △RST is a right triangle. Explain your strategy.

C

21. On a grid, draw several different rhombuses. Use slopes to determine the relationship between the diagonals.

22. Determine the value of c so that the line segment with endpoints B(2, 2) and C(9, 6) is parallel to the line segment with endpoints D(c, −7) and E(5, −3).

23. Given A(3, 5), B(7, 10), C(0, 2), and D(1, a), determine the value of a for which:
a) Line AB is parallel to line CD.
b) Line AB is perpendicular to line CD.

24. **a)** On grid paper, construct a square with side length 4 units and one vertex at the origin. Verify that the diagonals of this square are perpendicular.
b) Repeat part a for a square with side length a units.

Reflect

What have you learned about perpendicular lines and parallel lines? Include examples in your answer.

THE WORLD OF MATH

Historical Moment: Agnes Martin

Agnes Martin was born in Macklin, Saskatchewan, and lived from 1912 to 2004. She was an artist who used parallel lines and grids in her artwork. Before Agnes began a painting, she calculated the distances between pairs of parallel lines or bands. She then drew each line by hand, using a string stretched tightly across the surface to guide her, and a ruler to draw the line.