Solve and show all steps.

Given a quadrilateral ABCD with vertices A(1, 1), B(4, 5), C(7, 1), and D(4, -3). a) Find the length of diagonal AC. b) Find the length of diagonal BD. c) Find the midpoint of diagonal AC. d) Find the midpoint of diagonal BD.	Show all steps here
The vertices of a quadrilateral are P(-2, 3), Q(3, 5), R(6, 0), and S(1, -2). Is this quadrilateral a parallelogram? Justify your answer by finding the midpoints of its diagonals.	Show all steps here
A quadrilateral has vertices K(0, 0), L(5, 0), M(5, 3), and N(0, 3). Is this quadrilateral a rectangle? Justify your answer by finding the lengths of its diagonals.	Show all steps here
Consider a quadrilateral WXYZ with vertices W(0, 4), X(3, 0), Y(0, -4), and Z(-3, 0). Are the diagonals of this quadrilateral perpendicular? Justify your answer by calculating their slopes. What type of quadrilateral is WXYZ?	Show all steps here
A quadrilateral has vertices E(1, 1), F(4, 4), G(1, 7), and H(-2, 4). Is this quadrilateral a square? Justify your answer by checking if its diagonals are both congruent and perpendicular.	Show all steps here

Solve and show all steps.

a) 6
b) 8
c) (4, 1)
d) (4, 1)

Justification: Since the midpoints of both diagonals (PR and QS) are the same, the diagonals bisect each other.

Answer: Yes, the quadrilateral PQRS is a **parallelogram**.

Justification: A rectangle is a parallelogram with congruent diagonals. We can visually confirm this is a parallelogram (KL parallel to NM, KN parallel to LM). Since dKM=dLN, the diagonals are congruent.

Answer: Yes, the quadrilateral KLMN is a **rectangle**.

Justification: The diagonals WY and XZ are vertical and horizontal, respectively.
Vertical lines are perpendicular to horizontal lines.
Type of Quadrilateral: This quadrilateral has all four sides congruent (WX=XY=YZ=ZW=5).
A quadrilateral with all sides congruent is a rhombus.
Answer: Yes, the diagonals are **perpendicular**. WXYZ is a **rhombus**.
(It's not a square because its diagonals are not congruent: WY = 8, XZ = 6).

Perpendicularity Check: Yes, vertical and horizontal lines are perpendicular.
Justification: Since the diagonals are both congruent and perpendicular, and they also bisect each other (as they intersect at (1,4)), the quadrilateral EFGH has all the properties of a square's diagonals.
Answer: Yes, the quadrilateral EFGH is a **square**.