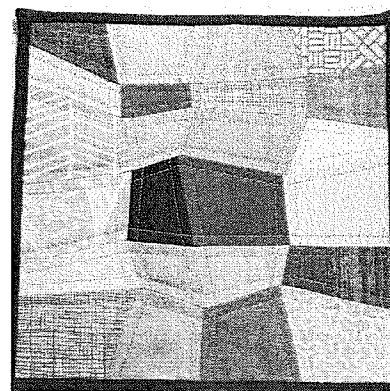# 6.7 Quadrilaterals—Beyond Definition
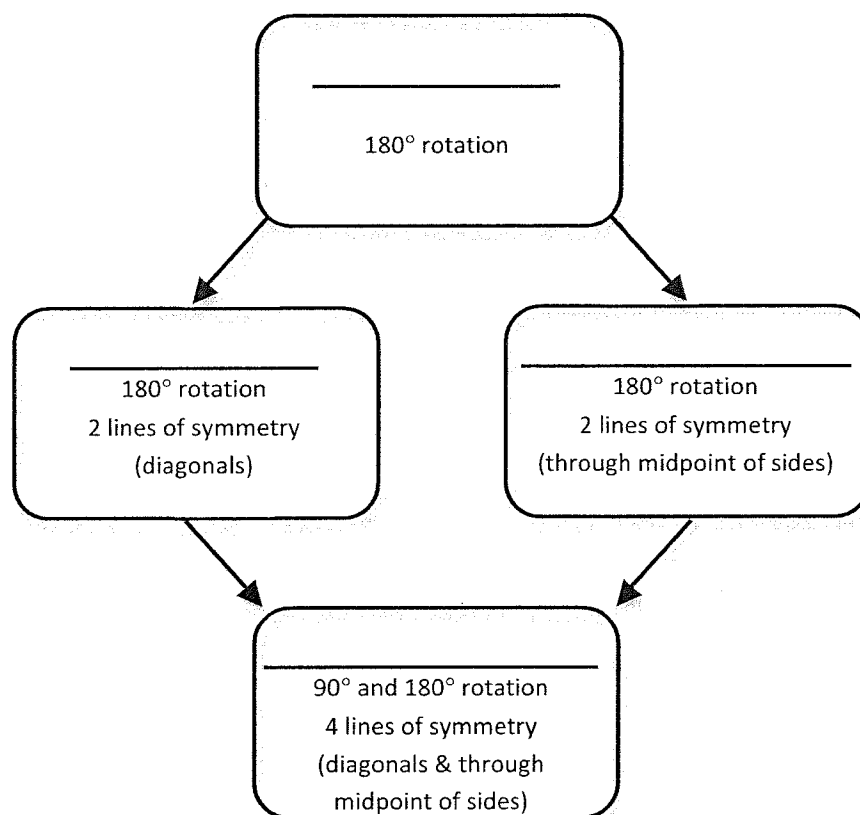*A Practice Understanding Task*

We have found that many different quadrilaterals possess line and/or rotational symmetry.

In the following chart, write the names of the quadrilaterals that are being described in terms of their symmetries.

```
           ┌──────────────────────┐
           │   _____        │
           │   180° rotation      │
           └──────────────────────┘
             ↙                  ↘
┌────────────────────┐   ┌────────────────────────┐
│  _____       │   │  _____           │
│  180° rotation     │   │  180° rotation         │
│  2 lines of symmetry│  │  2 lines of symmetry   │
│  (diagonals)       │   │  (through midpoint of  │
│                    │   │   sides)               │
└────────────────────┘   └────────────────────────┘
             ↘                  ↙
           ┌──────────────────────┐
           │  _____         │
           │  90° and 180° rotation│
           │  4 lines of symmetry │
           │  (diagonals & through│
           │   midpoint of sides) │
           └──────────────────────┘
```

What do you notice about the relationships between quadrilaterals based on their symmetries and highlighted in the structure of the above chart?
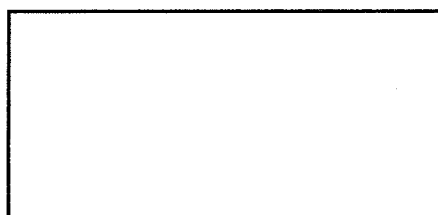
Based on the symmetries we have observed in various types of quadrilaterals, we can make claims about other features and properties that the quadrilaterals may possess.

1. A **rectangle** is a quadrilateral that contains four right angles.

Based on what you know about transformations, what else can we say about rectangles besides the defining property that all four angles are right angles? Make a list of additional properties of rectangles that seem to be true based on the transformation(s) of the rectangle onto itself. You will want to consider properties of the sides, the angles, and the diagonals.

2. A **parallelogram** is a quadrilateral in which opposite sides are parallel.
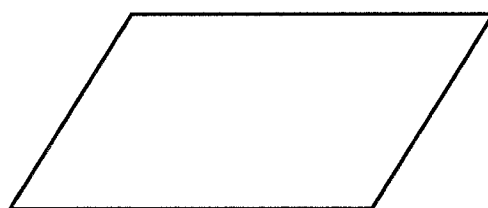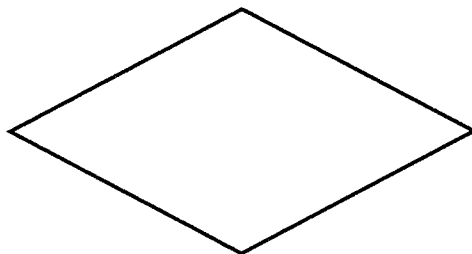
Based on what you know about transformations, what else can we say about parallelograms besides the defining property that opposite sides of a parallelogram are parallel? Make a list of additional properties of parallelograms that seem to be true based on the transformation(s) of the parallelogram onto itself. You will want to consider properties of the sides, angles and the diagonals.

3. A **rhombus** is a quadrilateral in which all four sides are congruent.

Based on what you know about transformations, what else can we say about a rhombus besides the defining property that all sides are congruent? Make a list of additional properties of rhombuses that seem to be true based on the transformation(s) of the rhombus onto itself. You will want to consider properties of the sides, angles and the diagonals.

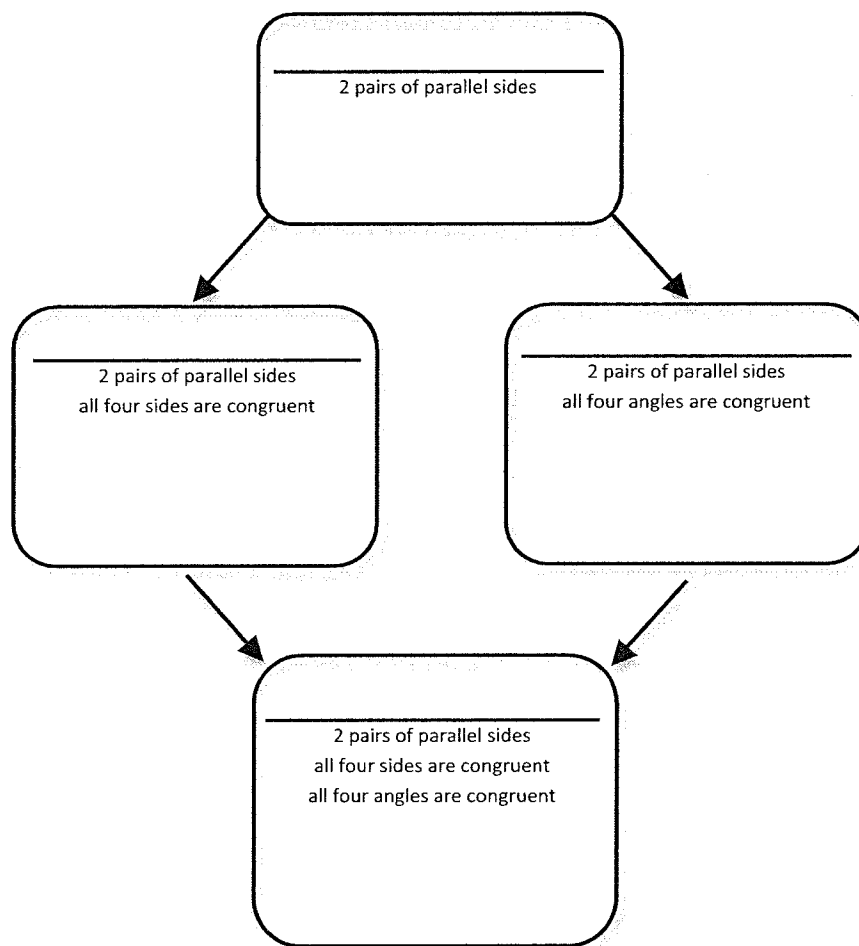4. A **square** is both a rectangle and a rhombus.
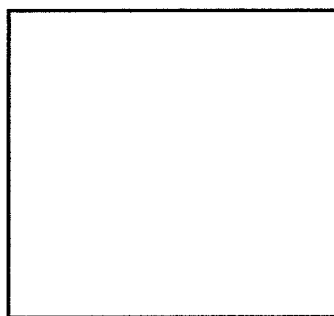
Based on what you know about transformations, what can we say about a square? Make a list of properties of squares that seem to be true based on the transformation(s) of the squares onto itself. You will want to consider properties of the sides, angles and the diagonals.

In the following chart, write the names of the quadrilaterals that are being described in terms of their features and properties, and then record any additional features or properties of that type of quadrilateral you may have observed. Be prepared to share reasons for your observations.

```
                    ┌─────────────────────────────┐
                    │  ─────────────────────────  │
                    │    2 pairs of parallel sides │
                    │                              │
                    └──────┬───────────────┬───────┘
                           │               │
                           ▼               ▼
      ┌────────────────────────┐    ┌────────────────────────┐
      │  ────────────────────  │    │  ────────────────────  │
      │  2 pairs of parallel   │    │  2 pairs of parallel   │
      │        sides           │    │        sides           │
      │  all four sides are    │    │  all four angles are   │
      │      congruent         │    │      congruent         │
      └───────────┬────────────┘    └───────────┬────────────┘
                  │                              │
                  ▼                              ▼
            ┌──────────────────────────────────┐
            │  ──────────────────────────────  │
            │    2 pairs of parallel sides     │
            │    all four sides are congruent  │
            │    all four angles are congruent │
            │                                  │
            └──────────────────────────────────┘
```

What do you notice about the relationships between quadrilaterals based on their characteristics and highlighted in the structure of the above chart?

How are the charts at the beginning and end of this task related? What do they suggest?