**Activity 3.6.1 Properties of Quadrilaterals on the Coordinate Plane**

**1.** Review of important coordinate formulas and theorems:

**a.** Write the slope formula.

**b.** Write the midpoint formula.

**c.** Write the distance formula.

**d.** What must be true about the slopes of parallel lines?

**e.** What must be true about the slopes of perpendicular lines?

**2.** What formulas or theorems from question 1 can help you prove the following quadrilaterals if you are given the ordered pairs of the four vertices of the quadrilateral.

**a.** Trapezoid

**b.** Parallelogram

**c.** Rhombus

**d.** Rectangle

**e.** Square

**f.** Kite

**3.** Given the following slopes and distances, classify quadrilateral *ABCD*. Explain why you made your decision.

|  |  |  |
| --- | --- | --- |
| Sides | Slopes | Distances |
| *AB* | 1/3 | 3.16 |
| *BC* | –1/4 | 4.12 |
| *CD* | 1/3 | 3.16 |
| *DA* | –1/4 | 4.12 |

**a.**



|  |  |  |
| --- | --- | --- |
| Sides | Slopes | Distances |
| *AB* | 3/6 | 6.71 |
| *BC* | –2 | 2.24 |
| *CD* | 3/6 | 6.71 |
| *DA* | –2 | 2.24 |

**b.**

|  |  |  |
| --- | --- | --- |
| Sides | Slopes | Distances |
| *AB* | 1/4 | 8.25 |
| *BC* | 4 | 8.25 |
| *CD* | 1/4 | 8.25 |
| *DA* | 4 | 8.25 |

**c.**

**d.**

|  |  |  |
| --- | --- | --- |
| Sides | Slopes | Distances |
| *AB* | 3/4 | 5 |
| *BC* | –4/3 | 5 |
| *CD* | 3/4 | 5 |
| *DA* | –4/3 | 5 |

**e.**

|  |  |  |
| --- | --- | --- |
|  | Slope | Distance |
| *AB* | 0/4 | 4 |
| *BC* | –1/2 | 2.236 |
| *CD* | 0/6 | 6 |
| *DA* | 1/2 | 2.236 |

**f.**

|  |  |  |
| --- | --- | --- |
|  | Slope | Distance |
| *AB* | 2/3 | 3.606 |
| *BC* | –2/3 | 3.606 |
| *CD* | 4/5 | 6.403 |
| *DA* | –4/5 | 6.403 |

**4.** For each of the following examples, calculate the length of all four sides and the slope of all four sides to most accurately classify each of the following quadrilaterals.

1. Quad *ADQU* with *A*(–2,3) , *D*(2,3), *Q*(3,–2), *U*(–1,–2)
2. Quad *PQRS* with *P*(–1,4) , *Q*(3,6), *R*(9,–3), *S*(5,–5)
3. Quad *QRSP* with *Q*(–4,6) , *R*(8,10), *S*(11,1), *P*(–1,–3)
4. Quad *EFGH* with *E*(0,–3) , *F*(–3,0), *G*(0,3), *H*(3,0)
5. Quad *DEFG* with *D*(–7,3) , *E*(–2,3), *F*(1,7), *G*(–4,7)

1. Quad *WXYZ* with *W*(0, 4), *X*(3, 6), *Y*(6, 4), *Z*(3, –1)

**5.** For the quadrilateral in 4b, prove that the diagonals bisect each other using one of the formulas from question 1. What theorem does this verify?

**6.** For the quadrilateral in 4c, prove that the diagonals are congruent using a formula from question 1. What theorem does this verify?

**7.** For the quadrilateral in 4d, prove that the diagonals are perpendicular bisectors of each other.

**8.** For the quadrilateral in 4e, prove that the diagonals are perpendicular. What theorem does this verify?