Quiz 2 Review

1. Define parallelogram. List the four properties that describe parallelograms.

Define: **a parallelogram is a quadrilateral with both pairs of opposite sides parallel**

Properties:
1. **Opposite sides parallel**
2. **Opposite sides congruent**
3. **Opposite \( \angle \)s congruent
4. **Diagonals bisect each other**
5. **Consecutive \( \angle \)s are supp.**

2. For what value of \( x \) is the quadrilateral a parallelogram? 

The expressions are referring to the length of the diagonals.

\[ 2x + 4 = x + 9 \]

\[ x = 5 \]

What property proves that the following are parallelograms?

3. Opposite sides \( \parallel \)

4. Diagonals bisect each other

5. Opposite sides parallel
Use properties of the given quadrilateral to find the values of the variables.

6. Parallelogram

\[ 2x-5 = 37 \]
\[ 3y+1 = 43 \]
\[ 2x = 42 \]
\[ x = 21 \]
\[ 3y = 42 \]
\[ y = 14 \]

7. Rhombus

\[ 14x - 2 \]
\[ 15y \]
\[ 3x + 9 \]
\[ 11x = 11 \]
\[ x = 1 \]
\[ 15y = 90 \]
\[ y = 6 \]

8. Rectangle

\[ 15y + 16 \]
\[ 2x + 30 \]
\[ 6x \]
\[ 13y + 24 \]
\[ 2y = 8 \]
\[ y = 4 \]
\[ 8x + 30 = 90 \]
\[ x = 7.5 \]

9. Parallelogram

\[ 13x - 2 \]
\[ 7x + 2 \]
\[ 13x - 2 + 7x + 2 = 180 \]
\[ 20x = 180 \]
\[ x = 9 \]

10. Square

\[ 3x + 7 \]
\[ 2x + 24 \]
\[ 3x + 7 = 2x + 24 \]
\[ x = 17 \]

11. Both pairs of opposite sides are congruent.

- Parallelogram
- Rhombus
- Square
- Rectangle

12. All angles are right angles.

- Square
- Rectangle

13. All sides are congruent.

- Rhombus
- Square

14. All angles AND all sides are congruent.

- Square

15. The diagonals are perpendicular.

- Kite
- Rhombus
- Square

16. Both pairs of opposite angles are congruent.

- Parallelogram
- Rhombus
- Square
- Rectangle

17. Find \( EB \).

\[ 2l \]

18. Find \( \angle CDA \).

\[ 76^\circ \]

19. If \( m\angle 4 = (4x - 10)^\circ \), solve for \( x \).

\[ 4x - 10 = 90 \]
\[ 4x = 100 \]
\[ x = 25 \]

ABCD is a rhombus. \( m\angle 1 = 52^\circ \), \( m\angle 3 = 38^\circ \), \( DB = 42 \)
27. Quadrilateral ABCD has vertices A(2,1), B(6,3), C(5,5), and D(1,3). Determine the most precise classification of BCDE: a parallelogram, rectangle, rhombus, or square. Then write an explanation to justify your answer.

Circle your explanation.

* I will show this one using slope formula.

**Slope of sides**

- **DC:** \(\frac{3-5}{1-5} = \frac{-2}{-4} = \frac{1}{2}\)
- **AB:** \(\frac{3-1}{6-2} = \frac{2}{4} = \frac{1}{2}\)  (*) adjacent sides have opposite reciprocal slopes... must be a rectangle or square.
- **AD:** \(\frac{3-1}{1-2} = \frac{2}{-1} = -2\)
- **CB:** \(\frac{5-3}{5-6} = \frac{2}{-1} = -2\)

**Slope of Diagonals**

- **DB:** \(\frac{3-3}{1-6} = \frac{0}{-5} = 0\)  (*) diagonals aren't perpendicular.
- **AC:** \(\frac{5-1}{5-2} = \frac{4}{3}\)

Its a [rectangle] because adjacent sides are opp/recip slopes (90° angles) and the diagonals aren't perpendicular.

Options to classify

1. Distance of sides
   Distance of diagonals

2. Slope of sides
   Slope of diagonals

3. Slope of sides
   Distance of sides
20. Find $m\angle 3. \quad 45^\circ$

21. Find $XQ. \quad 15$

22. Find $m\angle 5. \quad 90^\circ$

GHJJ is a rectangle. $JH = 20, \ m\angle 2 = 70^\circ$

23. Find $m\angle 1. \quad 20^\circ$

24. Find $Gl. \quad 20$

25. Find $JM. \quad 10$

Coordinate Proof. Verify the following quadrilaterals algebraically.

26. Quadrilateral LMNP has vertices $L(-2,0)$, $M(2,1)$, $N(3,-2)$, and $P(-1,-3)$. Determine the most precise classification of LMNP: a parallelogram, rectangle, rhombus or square. Then write an explanation to justify your answer. **Circle your explanation.**

\[ \text{Distance of sides} \]

\[ LM: \sqrt{(-2-2)^2 + (0-1)^2} = \sqrt{5} \]

\[ PN: \sqrt{(3+1)^2 + (-2+3)^2} = \sqrt{5} \]

\[ LP: \sqrt{(-2+1)^2 + (0-3)^2} = \sqrt{10} \]

\[ MN: \sqrt{(2-3)^2 + (1+2)^2} = \sqrt{10} \]

\[ \text{Distance of Diagonals} \]

\[ LN: \sqrt{(-2-3)^2 + (0+2)^2} = \sqrt{29} \]

\[ PM: \sqrt{(2+1)^2 + (1+3)^2} = \sqrt{25} = \sqrt{5} \]

\[ \text{It's a parallelogram because opposite sides are congruent and the diagonals are different} \]