

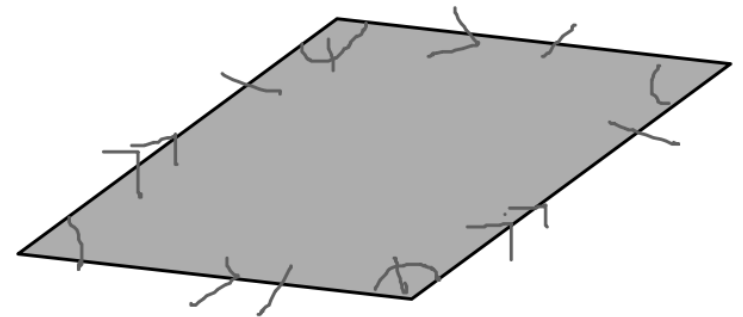
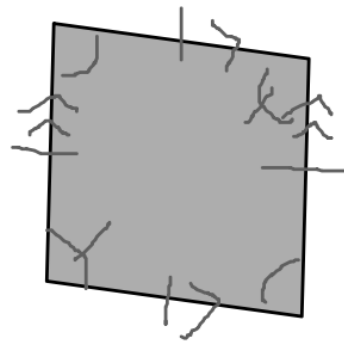
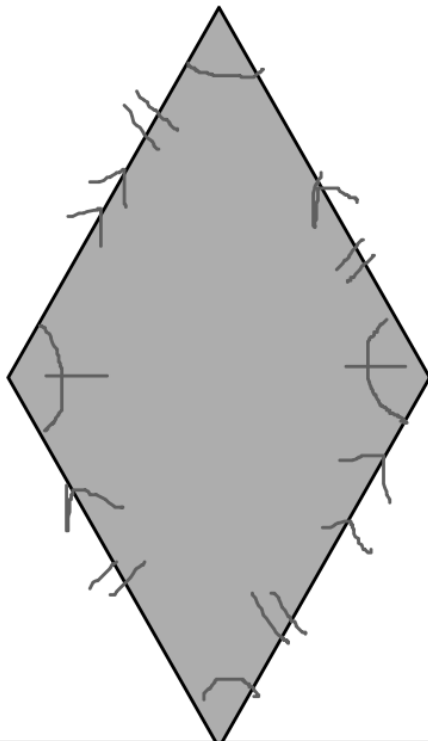
Unit 7 Lesson 6: Rhombi and Squares (Section 6-5)

OBJ: Recognize and apply the properties of a rhombi. Recognize and apply the properties of a square. Determine whether quadrilaterals are rectangles, rhombi, or squares

Rhombus - a parallelogram with all four sides congruent.

Since a rhombus is a parallelogram then what pieces are parallel?

What pieces are congruent? Think about it.



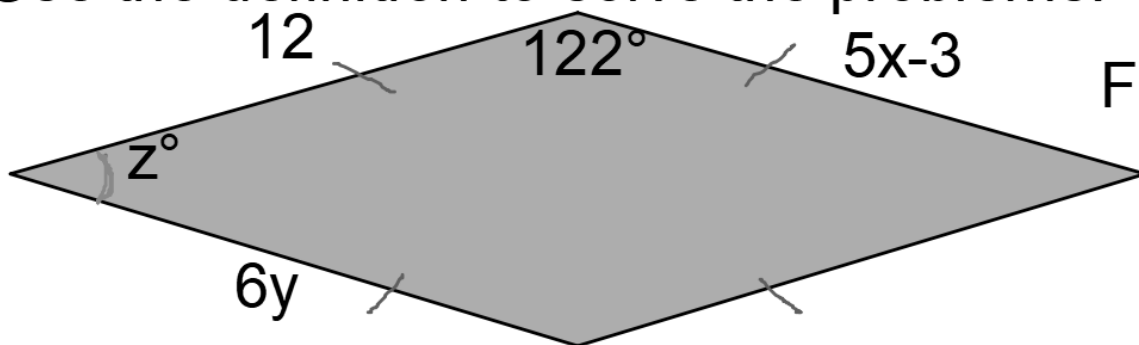
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The shape below is a rhombus.

By definition - all 4 sides are congruent and it is a parallelogram.

Use the definition to solve the problems.



Find x , y and z .

$$5x - 3 = 12$$

$$5x = 15$$

$$x = 3$$

$$6y = 12$$

$$y = 2$$

$$\begin{array}{r} z + 122 = 180 \\ -122 \quad -122 \\ \hline \end{array}$$

$$z = 58^\circ$$

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How could we use distance to show that all four sides are congruent?

Prove that ABCD is a rhombus.

A(-9,1) B(2, 3), C(12, -2), D(1, -4)

$$AB = \sqrt{(-9-2)^2 + (1-3)^2} = \sqrt{(-11)^2 + (-2)^2} = \sqrt{121+4} = \sqrt{125}$$

$$BC = \sqrt{(2-12)^2 + (3+2)^2} = \sqrt{(-10)^2 + (5)^2} = \sqrt{100+25} = \sqrt{125}$$

$$CD = \sqrt{(12-1)^2 + (-2+4)^2} = \sqrt{(11)^2 + (2)^2} = \sqrt{121+4} = \sqrt{125}$$

$$AD = \sqrt{(-9-1)^2 + (1+4)^2} = \sqrt{(-10)^2 + 5^2} = \sqrt{100+25} = \sqrt{125}$$

$AB = BC = CD = AD$ it is a rhombus

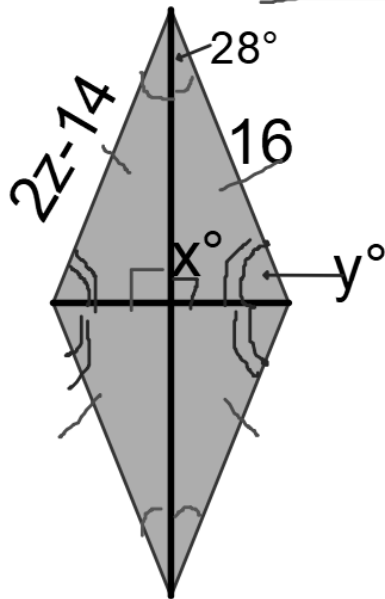
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Special Properties of a Rhombus

Theorem - The diagonals of a rhombus are perpendicular

form 4 rt \angle s.



The figure is a rhombus, find x , y and z .

$$x = 90^\circ$$

$$\begin{array}{r} 2z - 14 = 16 \\ + 14 \quad + 14 \end{array}$$

$$\frac{2z}{2} = \frac{30}{2}$$

$$\begin{array}{r} y + 28 = 90 \\ - 28 \quad - 28 \end{array}$$

$$y = 62^\circ$$

$$z = 15$$

$$180 - 90 = 90$$

Theorem - The diagonals of a rhombus bisect a pair of opposite angles.

split in half.

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ABCD is a rhombus

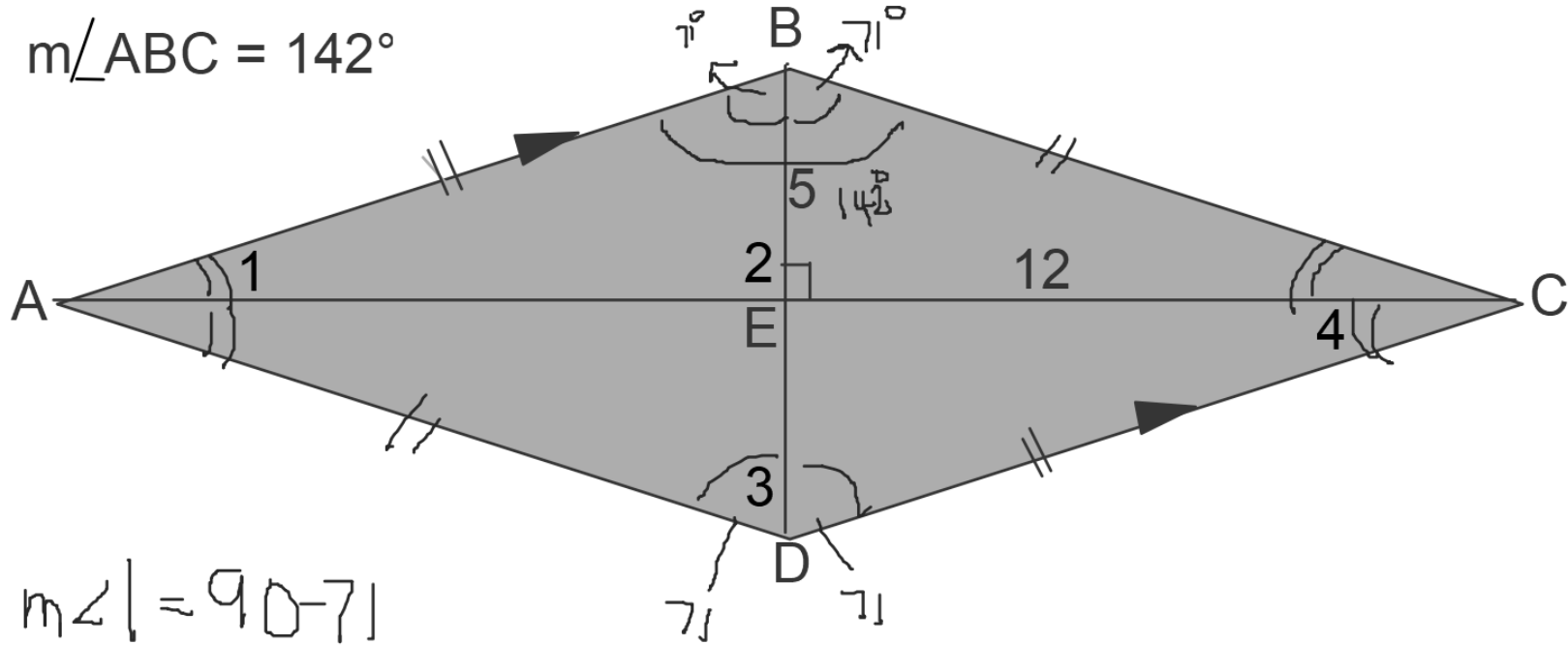
Find BD Find BC

Find the numbered angles

$$m\angle 3 = 71^\circ$$

$$m\angle 2 = 90^\circ$$

$$m\angle ABC = 142^\circ$$



$$m\angle 1 = 90 - 71$$

$$m\angle 1 = 19^\circ$$

$$m\angle 4 = 19^\circ$$

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Square is a parallelogram with 4 congruent sides and 4 right angles(definition)

Square - Is a parallelogram that is BOTH a rectangle and a rhombus.

Because a square is a parallelogram it has the following properties.

- 1) **Both pairs of opp. sides parallel.**
- 2) **Both pairs of opp. sides congruent.**
- 3) **Diagonals bisect each other.**
- 4) **Both pairs of opp. angles are congruent.**
- 5) **Consecutive angles are supplementary.**

IN ADDITION, because a square is a rectangle it has the following additional properties

- 6) **All angles are right angles.**
- 7) **Diagonals are congruent.**

FINALLY, because a square is a rhombus it has the following additional properties.

- 8) **All four sides are congruent.**
- 9) **Each diagonal bisects a pair of opp. angles.**
- 10) **Diagonals are perpendicular.**

Shape →	Parallelogram	Rectangle	Rhombus	Square	Trapezoid	Isosceles Trapezoid	Kite
Opposite sides are parallel							
Opposite sides are congruent							
Opposite angles are congruent							
Consecutive interior angles are supplementary							
Diagonals bisect each other							
All angles are right angles							
Diagonals are congruent							
All sides are congruent							
Diagonals bisect each angle							
Diagonals are perpendicular							
Base angles are congruent							
Exactly one pair of opposite angles congruent							
Exactly two pair of consecutive congruent sides							

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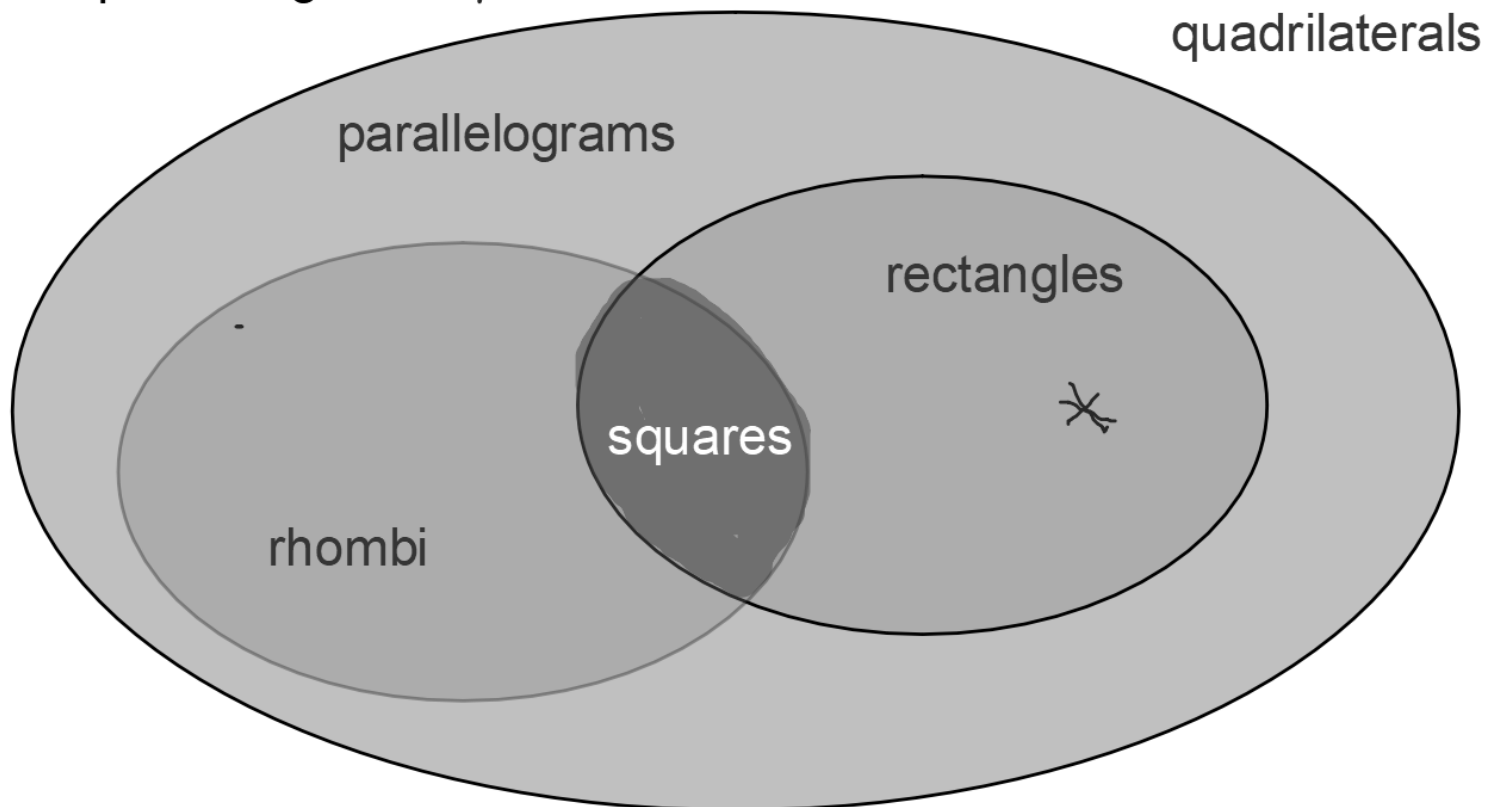
True or False

all square are quadrilaterals T

all rectangles are squares F

all parallelograms are rhombi F

all rhombi are parallelograms T



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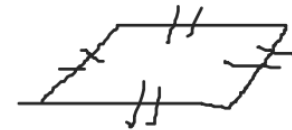
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Ways to prove that ^{4 sides} quadrilateral is a rhombus or square

✱ Prove that the quadrilateral is a parallelogram first.

● If the diagonals of the parallelogram are perpendicular, then it is a rhombus. Slopes are opp. reciprocals

● If the diagonals of the parallelogram bisect a pair of opposite angles, then it is a rhombus.



● If one pair of consecutive sides of a parallelogram are congruent, then it is a rhombus.

● If a quadrilateral or parallelogram is both a rectangle and a rhombus, then it is a square.