The SAT Initiative

G9 Topic Breakdown
SOL - Geometry
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Students will verify characteristics of quadrilaterals and use properties of quadrilaterals to solve real-world problems

- *Solve problems, including real-world problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids.*
- *Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula.*
- *Prove the characteristics of quadrilaterals, using deductive reasoning, algebraic, and coordinate methods.*
- *Prove properties of angles for a quadrilateral inscribed in a circle.*

What is a polygon?

→ A *figure* with **three or more connected sides** and at least **three angles**

What is a quadrilateral?

→ A *polygon* with *exactly* **four sides** and **four angles**

- A CIRCLE IS **NOT** A POLYGON

- **ALL** QUADRILATERALS ARE POLYGONS

- **NOT ALL** POLYGONS ARE QUADRILATERALS

What is a parallelogram?

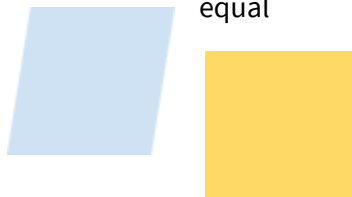→ A *polygon* with exactly **four sides; opposite sides are parallel**

What is a rectangle?

→ A *polygon* with exactly **four sides** and **four RIGHT angles (90 degree angles)**

What is a rhombus?

→ A *polygon* with *exactly* **four equal sides** and **four angles**; diagonal angles are equal

What is a square?

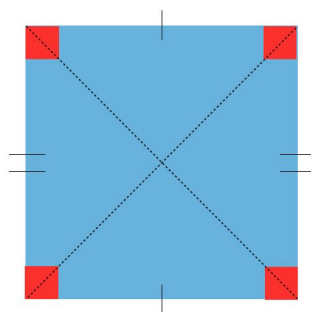→ A *polygon* with *exactly* **four equal sides** and **four RIGHT** angles

- A SQUARE IS **BOTH** A RHOMBUS **AND** A RECTANGLE
- A RHOMBUS IS **NOT** A SQUARE; A RECTANGLE IS **NOT** A SQUARE
- A RHOMBUS AND A SQUARE ARE **NOT** THE SAME

What is a trapezoid?

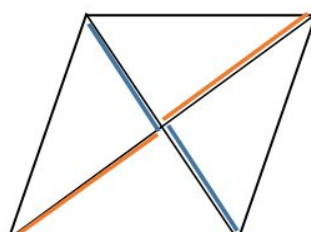→ A parallelogram with exactly **one pair of parallel sides**

A CLOSER LOOK AT SHAPES

SQUARES ARE...
- POLYGONS
- QUADRILATERALS
- PARALLELOGRAM
- RECTANGLE
- RHOMBUS

- FOUR EQUAL & PARALLEL SIDES
- FOUR RIGHT ANGLES
- DIAGNOLS BISECT (CUT IN HALF) EACH OTHER
- DIAGNOLS BISECT ANGLES
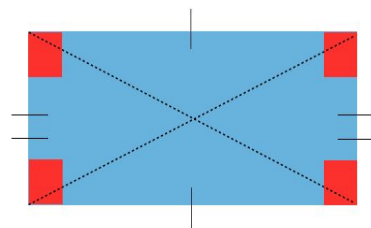- DIAGNOLS ARE EQUAL

RHOMBI ARE...
- POLYGONS
- QUADRILATERALS
- PARALLELOGRAM

- FOUR EQUAL & PARALLEL SIDES
- OPPOSITE ANGLES ARE EQUAL
- DIAGONALS BISECT EACH OTHER
- DIAGNOLS BISECT ANGLES

RECTANGLES ARE...
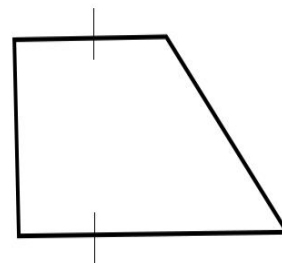- POLYGONS
- QUADRILATERALS
- PARALLELOGRAM

- FOUR PARALLEL SIDES
- FOUR RIGHT ANGLES
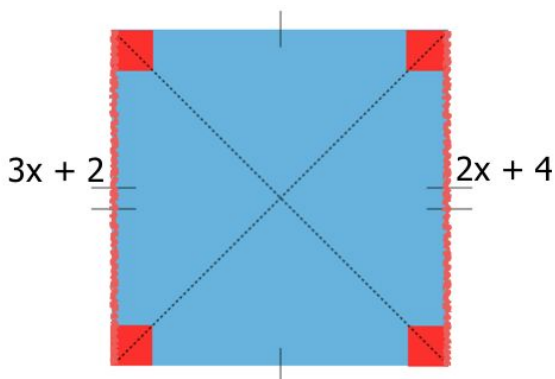- DIAGONALS ARE EQUAL
- DIAGONALS BISECT EACH OTHER

TRAPEZOIDS ARE...
- POLYGONS
- QUADRILATERALS
- PARALLELOGRAM

- FOUR SIDES & ANGLES
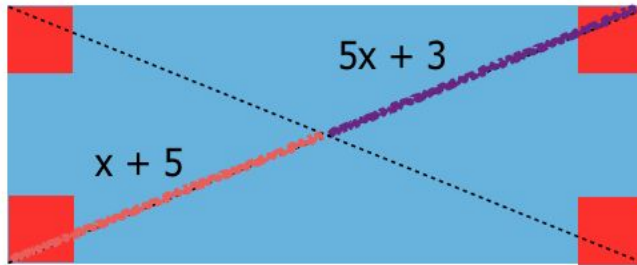- ONE SET OF PARALLEL SIDES

Find X, Assuming x is a *Square*

$3x + 2$ $2x + 4$

$2x + 4 = 3x + 2$

$4 = x + 2$

$2 = x$

Both Sides = 8

Find X, Assuming x is a _Rectangle_
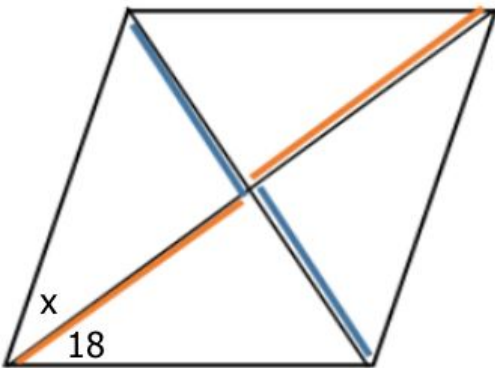
$5x + 3 = x + 5$

$4x = 2$

$X = ½$

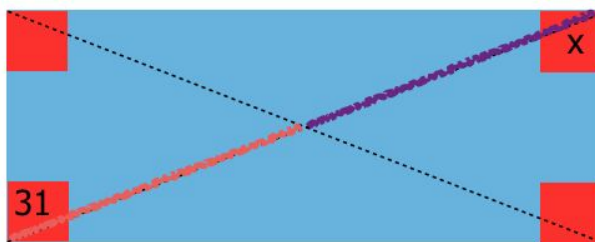Both Diagonals = 5.5

Find X, Assuming x is a _Rhombus_

$X = 18$

The diagonals of rhombuses bisect the angles, meaning that it cuts the angles in half.

If one half = 18, the other half = 18

Find X, Assuming x is a _Rectangle_

$X = 31$

The diagonals of a rectangle don't cut angles in half. But opposite diagonal angles (when cut in half) = each other.

Practice Problems
G.9 Review

1. A shape has two sets of equal parallel lines and equal diagonal angles. Which of the following does not accurately describe the shape?
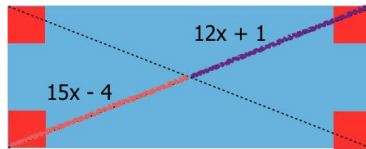
A) Parallelogram
B) Quadrilateral
C) Trapezoid
D) Polygon

2. A shape has the following side lengths: 4, 7, 7, 4. If any two angles of this shape are added together, what is the sum?
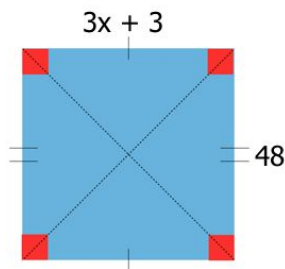
A) 90
B) 180
C) 270
D) 360

3. A shape has four sides, but only one set of parallel sides. Which of the following could be the shape described?

A) Trapezoid
B) Circle
C) Rhombus
D) Parallelogram

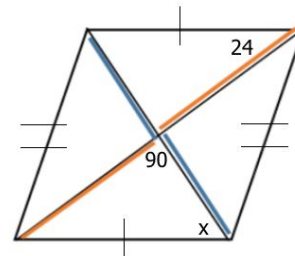4. For what value of x, would the shape above be a rectangle?

A) .6
B) .3
C) 4
D) .5

5. Assuming the figure above is a square, find the value of x.

A) 48
B) 45
C) 15
D) 33

6. Find the value of angle x that would make the shape above a rhombus.

A) 132
B) 48
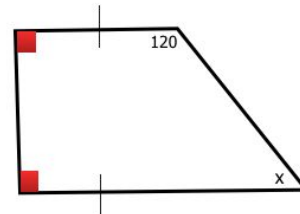C) 24
D) 66

7. Which of the following statements is false?

A) A square is a rhombus
B) All polygons are quadrilaterals
C) A circle is not a polygon
D) A rectangle is not a square

8. Which of the following statements about rectangles is true?

A) The diagonals of a rectangle bisect each other
B) The diagonals of a rectangle bisect its angles
C) Rectangles have only one set of parallel sides
D) The diagonals of a rectangle are not equal

9. Assuming the shape above is a trapezoid, find the missing angle.

A) 180
B) 90
C) 120
D) 60

Answer Key: Practice Problems
G.9 Geometry

1.	C
2.	B
3.	A
4.	A
5.	C
6.	D
7.	B
8.	A
9.	D