

Chapter 8 § 5

Rhombi and Squares

Theorems :

(8-15) – The diagonals of a rhombus are perpendicular.

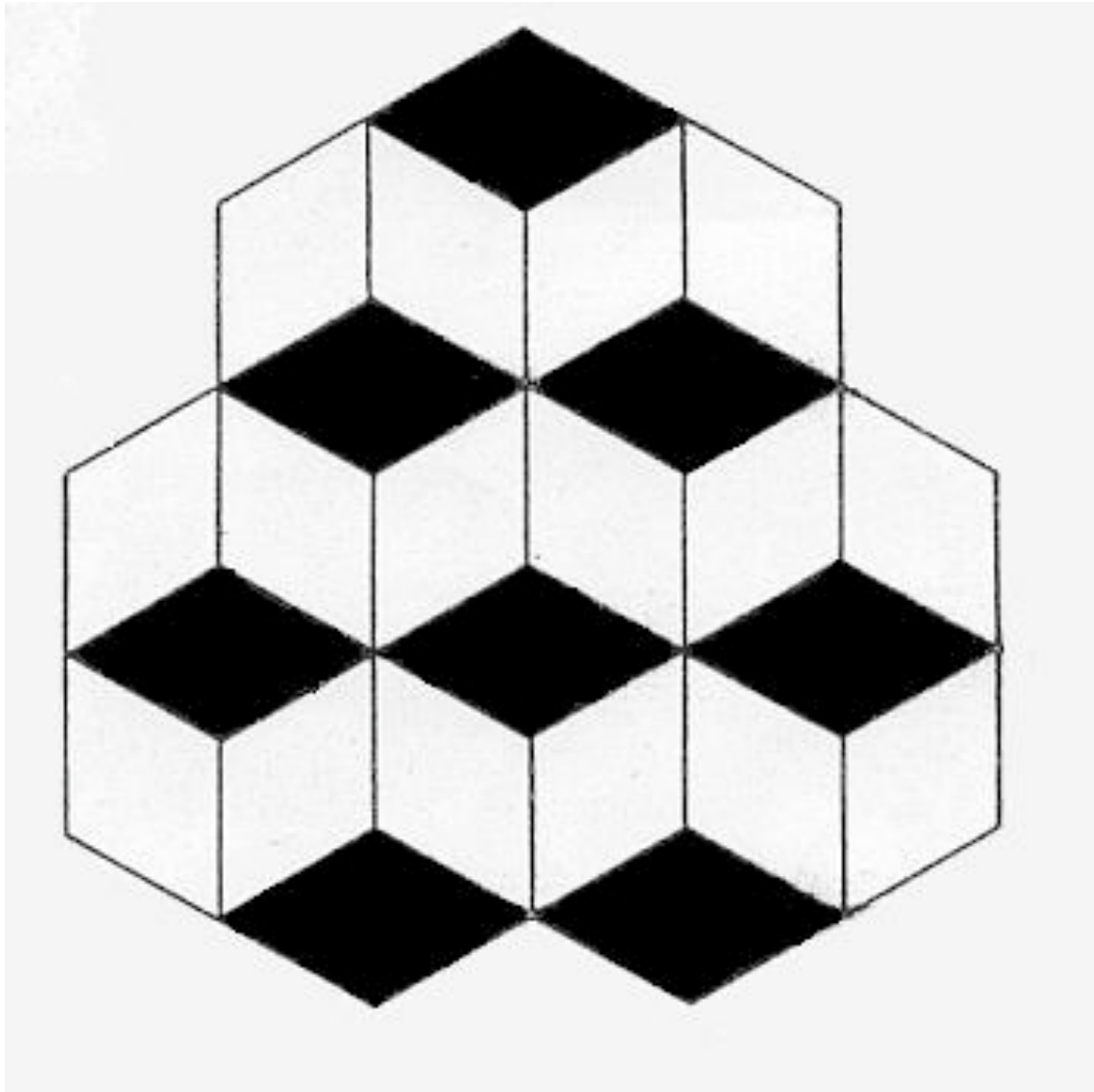
(8-16) – If the diagonals of a parallelogram are perpendicular, then the parallelogram is a rhombus.

(8-17) – Each diagonal of a rhombus bisects a pair of opposite angles.

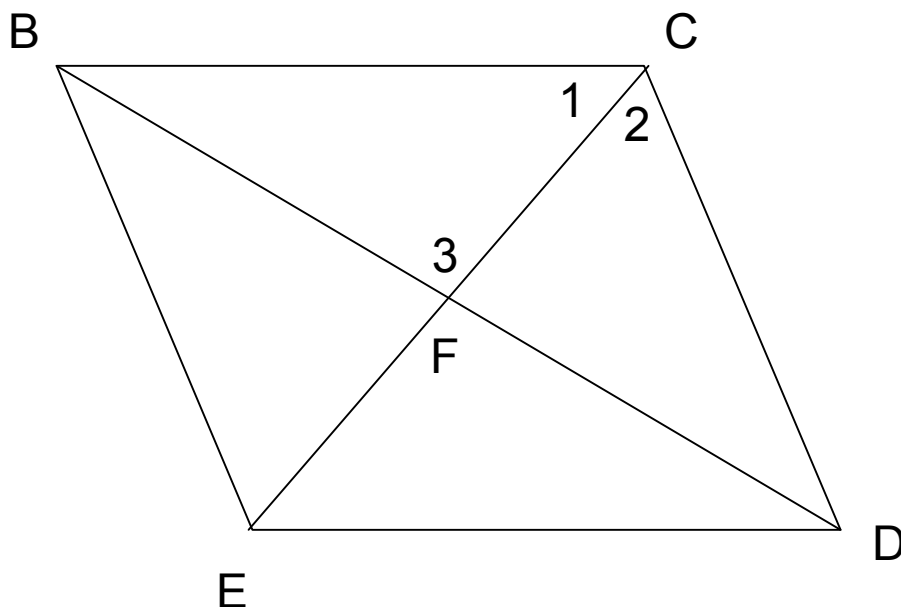
Definitions :

Rhombus – a parallelogram with four congruent sides.

Square – a parallelogram with four congruent sides and angles.



Use rhombus BCDE and the given information to find each missing value.



If $BD = 15$ find BF

$$BD = 2(BF)$$

$$\frac{15}{2} = \frac{2x}{2}$$

$$7.5 = x$$

If $m\angle 3 = y^2 + 26$, find y .

$$y^2 + 26 = 90$$

$$\frac{-26 \quad -26}{-26 \quad -26}$$

$$y^2 + 0 = 64$$

$$\sqrt{y^2} = \sqrt{64}$$

$$y = 8 \text{ or } -8$$

Determine whether parallelogram WXYZ is a rhombus, a rectangle, or a square for W (1, 10), X (-4, 0), Y (7, 2), and Z (12, 12).

First, check the slope of the diagonals:

$$\text{Slope of WY} = \frac{10 - 2}{1 - 7} = \frac{-4}{3}$$

$$\text{Slope of XZ} = \frac{0 - 12}{-4 - 12} = \frac{3}{4}$$

Since the slopes of the diagonals are negative reciprocals of each other, then so far the shape is either a square or a rhombus.

Second, check the distance of the diagonals:

$$\text{WY} = \sqrt{(1 - 7)^2 + (10 - 2)^2} = \sqrt{100} = 10$$

$$\text{XZ} = \sqrt{(-4 - 12)^2 + (0 - 12)^2} = \sqrt{400} = 20$$

Since the distances are not equal then the parallelogram is a rhombus.

Properties	Parallelogram	Rectangle	Rhombus	Square
The diagonals bisect each other	YES	YES	YES	YES
The diagonals are congruent	NO	YES	NO	YES
Each diagonal bisects a pair of opposite angles	NO	NO	YES	YES
The diagonals are perpendicular	NO	NO	YES	YES