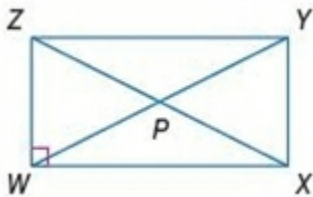


6-4 Special Parallelograms: Rectangles

REGULARITY Quadrilateral $WXYZ$ is a rectangle.



15. If $PY = 3x - 5$ and $WP = 2x + 11$, find ZP .

SOLUTION:

The diagonals of a rectangle bisect each other. So, $PY = WP$.

$$3x - 5 = 2x + 11$$

$$x = 16$$

The diagonals of a rectangle are congruent and bisect each other. So, $\triangle ZPW$ is an isosceles triangle.

$$ZP = WP$$

$$= 2(16) + 11$$

$$= 43$$

ANSWER:

43

16. If $m\angle ZYW = 2x - 7$ and $m\angle WYX = 2x + 5$, find $m\angle ZYW$.

SOLUTION:

All four angles of a rectangle are right angles. So, $m\angle ZYW + m\angle WYX = 90$.

$$2x - 7 + 2x + 5 = 90$$

$$4x = 92$$

$$x = 23$$

$$m\angle ZYW = 2(23) - 7$$

$$= 39$$

ANSWER:

39

17. If $ZP = 4x - 9$ and $PY = 2x + 5$, find ZX .

SOLUTION:

The diagonals of a rectangle are congruent and bisect each other. So, $ZP = PY$.

$$4x - 9 = 2x + 5$$

$$2x = 14$$

$$x = 7$$

Then $ZP = 4(7) - 9 = 19$.

Therefore, $ZX = 2(ZP) = 38$.

ANSWER:

38

18. If $m\angle XZY = 3x + 6$ and $m\angle XZW = 5x - 12$, find $m\angle YXZ$.

SOLUTION:

All four angles of a rectangle are right angles. So,

$$m\angle YZX + m\angle XZW = 90.$$

$$3x + 6 + 5x - 12 = 90$$

$$8x = 96$$

$$x = 12$$

$$m\angle YXZ = m\angle XZW = 5(12) - 12 = 48$$

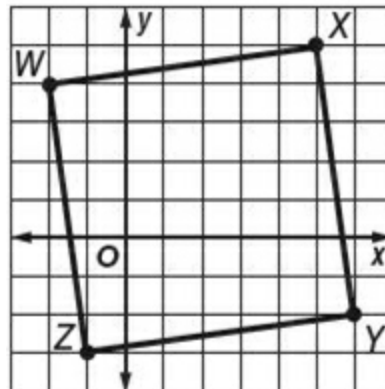
ANSWER:

48

COORDINATE GEOMETRY Graph each quadrilateral with the given vertices. Determine whether the figure is a rectangle. Justify your answer using the indicated formula.

22. $W(-2, 4)$, $X(5, 5)$, $Y(6, -2)$, $Z(-1, -3)$; Slope Formula

SOLUTION:



6-4 Special Parallelograms: Rectangles

Use the slope formula to find the slope of the sides of the quadrilateral.

$$m_{WX} = \frac{5-4}{5-(-2)} = \frac{1}{7}$$

$$m_{XY} = \frac{-2-5}{6-5} = -7$$

$$m_{YZ} = \frac{-3-(-2)}{-1-6} = \frac{1}{7}$$

$$m_{WZ} = \frac{-3-4}{-1-(-2)} = -7$$

The slopes of each pair of opposite sides are equal.

So, the two pairs of opposite sides are parallel.

Therefore, the quadrilateral $WXYZ$ is a parallelogram.

The products of the slopes of the adjacent sides are -1 .

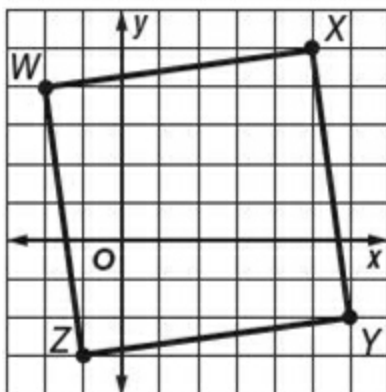
So, any two adjacent sides are perpendicular to each other. That is, all four angles are right angles.

Therefore, $WXYZ$ is a rectangle.

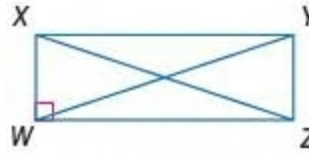
ANSWER:

Yes; slope of $\overline{WX} = \frac{1}{7}$ = slope of \overline{YZ} , slope of

$\overline{XY} = -7$ = slope of \overline{ZW} . So $WXYZ$ is a parallelogram. The product of the slopes of consecutive sides is -1 , so the consecutive sides are perpendicular and form right angles. Thus, $WXYZ$ is a rectangle.



ALGEBRA Quadrilateral $WXYZ$ is a rectangle.



39. If $XW = 3$, $WZ = 4$, and $XZ = b$, find YW .

SOLUTION:

The diagonals of a rectangle are congruent to each other. So, $YW = XZ = b$. All four angles of a rectangle are right angles. So, $\triangle XWZ$ is a right triangle. By the Pythagorean Theorem, $XZ^2 = XW^2 + WZ^2$.

$$b^2 = (3)^2 + (4)^2 = 25$$

$$b = \sqrt{25} = 5$$

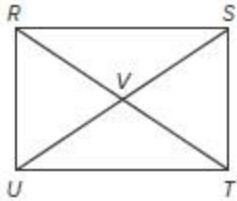
Therefore, $YW = 5$.

ANSWER:

5

6-4 Special Parallelograms: Rectangles

50. **MULTI-STEP** Elena and Joshua use chalk to draw a race course for remote-controlled cars, as shown. They draw the course so that $RSTU$ is a rectangle with $RS = 50$ feet and $RT = 60$ feet. During the first race, the cars travel from R to S to V and back to R . How far do the cars travel?



- A 170 ft
- B 110 ft
- C 80 ft
- D 60 ft

SOLUTION:

The distance from R to S is 50 feet. The distance from S to V is half of RT , or 30 feet. The distance from V to R is also half of RT , or 30 feet. So, the cars travelled $50 + 30 + 30 = 110$ ft. So, the correct answer is choice B.

ANSWER:

B