Properties of Two-Dimensional Figures

Properties of Two-Dimensional Figures: Apply, Compare, and Design

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Matching arrow marks show parallel side pairs. If extended, parallel sides never meet. Perpendicular sides meet at $90°$. Every right angle in a pictured polygon is marked with a small square.

Worked example

Two horizontal bars are 2 cm apart. A vertical bar joins them. How are the two horizontal bars related? How does the connector meet them?

1. The horizontal bars stay 2 cm apart along their entire length and would not meet if extended.

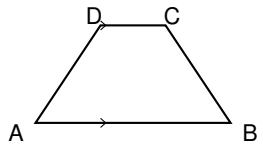
2. Where a vertical bar meets a horizontal one it forms $90°$, so the connector is perpendicular to both.

Answer: The horizontal bars are parallel. The connector meets each at a right angle.

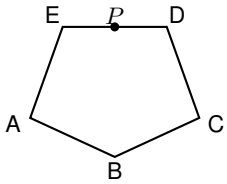
Practice Problems

Show your thinking.

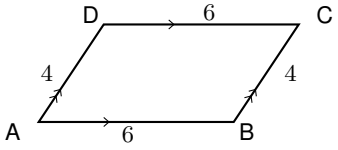
1. A gate design must have exactly one pair of parallel sides and no right angles. Does the pictured panel qualify? Identify the parallel pair and explain the angle count.



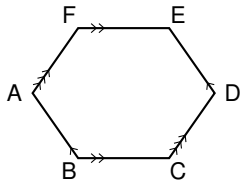
2. A display adds a dot P halfway along side DE of the pictured sign. A worker counts P as another vertex. Does the sign now have six sides? Explain.



3. A maker has 18 cm of trim for the boundary of this panel. The side labels are in centimeters. Is that enough? Use the equal-length pairs.

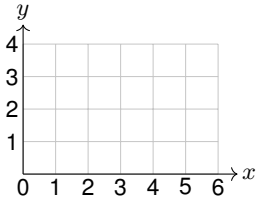


4. A print shop colors each parallel pair of sides on this sign a different color. How many colors does it need? Name the two sides in each color group.



5. A four-sided frame has one pair of horizontal opposite sides and one pair of vertical opposite sides. Can it have exactly two right angles? Explain.

6. Plot posts $J(1, 1)$, $K(5, 1)$, and $L(1, 3)$ and connect all three to make a triangle. At which post do the sides meet at a right angle? Name those sides.



Answer Key

1. Yes: $AB \parallel CD$ only, with 0 right angles.
2. No. The sign still has 5 sides and 5 vertices.
3. No. The boundary needs 20 cm, so 2 cm more is needed.
4. 3 colors: AB with DE, BC with EF, and CD with FA.
5. No. It must have 4 right angles.
6. At J: $JK \perp JL$.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. AB and CD share the 1 arrow marking. The other two sides slant in different directions, so they are not a second pair.

2. Each corner joins a horizontal side to a slanted side, not to a vertical side. That gives 0 right angles.

Problem 2

1. Before adding P, the boundary has 5 straight sides, including DE.

2. There is no turn at P: DP and PE lie on one straight side. The 5 original corners still give 5 vertices.

Problem 3

1. AB and CD need $2 \times 6 = 12$ cm. BC and DA need $2 \times 4 = 8$ cm.

2. The total is $12 + 8 = 20$ cm. The shortage is $20 - 18 = 2$ cm.

Problem 4

1. Match 1 arrow on AB and DE, then 2 arrows on BC and EF.

2. The 3 arrows on CD and FA make the last pair. Use one color for each of the 3 pairs.

Problem 5

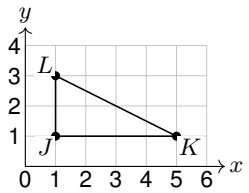
1. The 2 horizontal sides do not meet each other. The 2 vertical sides do not meet each other.

2. Every corner joins one horizontal and one vertical side, forming $90°$. There are 4 such corners, not 2.

Problem 6

1. JK shares height 1, so draw it horizontally. JL shares column 1, so draw it vertically.

2. Join K to L to close the triangle. The horizontal and vertical sides meet at $90°$ at J.



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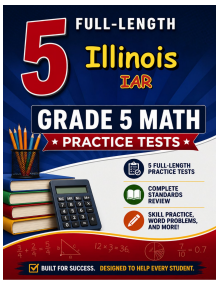

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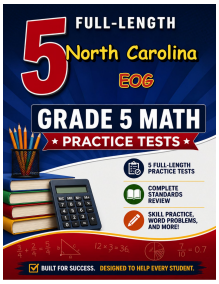

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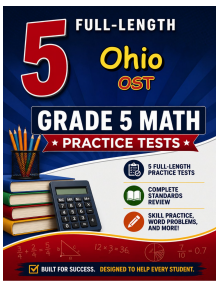

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