Homework · reason clearly

LESSON 1.1 / Geometry language and logical foundations

Eight problems. Attempt without notes first; then check and record one correction.

QUESTION 1

Sketch a line through P and Q, a segment with endpoints R and S, and a ray with endpoint T passing through U. Label the objects in notation.

QUESTION 2

P, Q, R and S lie in the order P-Q-R-S. Compare $\overrightarrow{PQ}$ with $\overrightarrow{PS}$, and $\overrightarrow{QP}$ with $\overrightarrow{QR}$. Explain your verdicts.

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QUESTION 3

Explain why three collinear points lie in a plane but do not determine a unique plane. Illustrate your explanation.

QUESTION 4

Classify and justify: (a) a midpoint is a point on a segment dividing it into two congruent parts; (b) exactly one line passes through two distinct points, taken as an accepted starting fact; (c) a result established by a valid argument from the foundations.

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QUESTION 5

Draw one diagram where $AB = CD$ is given by matching tick marks, and one where the segments merely look equal. State what is justified in each.

QUESTION 6

Give a counterexample to each claim: (a) every triangle is isosceles; (b) every quadrilateral with four equal sides is a square. Explain how each example meets the assumption but fails the conclusion.

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QUESTION 7

Using the inclusive definition of rectangle, explain why “every square is a rectangle” is true. Write its converse and decide whether that converse is true.

QUESTION 8

M is given as the midpoint of $\overline{AB}$. If $AM = 2x + 3$ and $MB = 4x - 5$, find x, each half-length and AB. Give a reason for each step.