Written Exercises

Complete with *always, sometimes,* or *never.*

A

1. Two points _?_ lie in exactly one line.
2. Three points _?_ lie in exactly one line.
3. Three points _?_ lie in exactly one plane.
4. Three collinear points _?_ lie in exactly one plane.
5. Two planes _?_ intersect.
6. Two intersecting planes _?_ intersect in exactly one point.
7. Two intersecting lines _?_ intersect in exactly one point.
8. Two lines _?_ intersect in exactly one point.
9. Two intersecting lines _?_ lie in exactly one plane.
10. A line and a point not on that line _?_ lie in more than one plane.
11. A line _?_ contains exactly one point.
12. When A and B are in a plane, $\overleftrightarrow{AB}$ is _?_ in that plane.

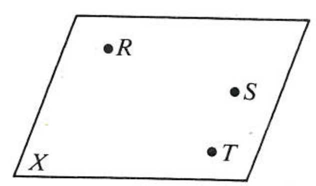
B

13. Rewrite the following statement as two statements, one describing existence and the other describing uniqueness:

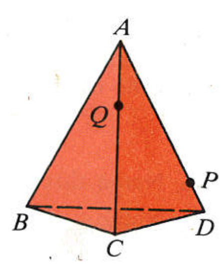
    An angle has exactly one bisector.

14. Draw a figure for Theorem 1-9 and state in terms of the figure what is given and what is to be proved. Do not complete the proof.

15. Suppose R, S, and T are three noncollinear points.
    - **a.** State the postulate that guarantees the existence of a plane X containing R, S, and T.
    - **b.** State the postulate that guarantees that any point P on $\overline{RS}$ is in plane X.
    - **c.** State the postulate that guarantees that $\overleftrightarrow{TP}$ exists.
    - **d.** State the postulate that guarantees that $\overleftrightarrow{TP}$ is in plane X.

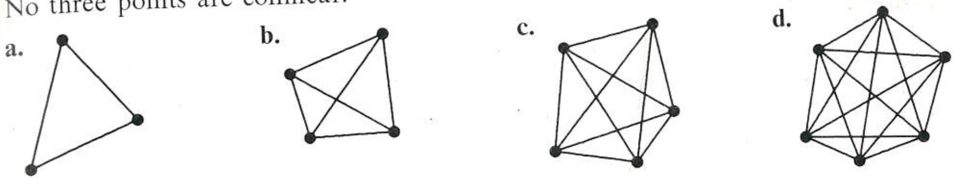


16. Suppose A, B, C, and D are four noncoplanar points.
    - **a.** State the postulate that guarantees the existence of planes ABC, ABD, ACD, and BCD.
    - **b.** Explain how the Ruler Postulate guarantees the existence of a point P between A and D and a point Q between A and C.
    - **c.** State the postulate that guarantees the existence of plane BPQ.
    - **d.** Explain why there are an infinite number of planes through point P.



C

17. State how many segments can be drawn between the points in each figure. No three points are collinear.

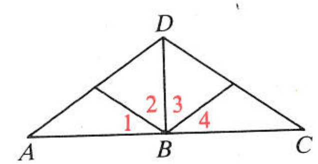


a. 3 points, _?_ segments
b. 4 points, _?_ segments
c. 5 points, _?_ segments
d. 6 points, _?_ segments

- **e.** Without making a drawing, predict how many segments can be drawn between seven points, no three of which are collinear.
- **f.** How many segments can be drawn between n points, no three of which are collinear?

Self-Test 3

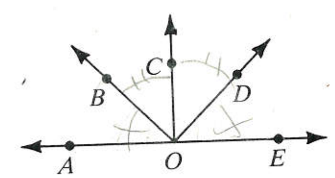
In the diagram, $\overline{BD} \perp \overline{AC}$ and $\angle 1 \cong \angle 4$. Write the definition or theorem that justifies the conclusion.



1. $\angle ABD \cong \angle CBD$
2. $\angle DBC$ is a right angle.
3. $\angle 3$ and $\angle 4$ are complements.
4. Complete: If two lines form congruent adjacent angles, then _?_.
5. Name the five parts of a proof.
6. If planes P and Q intersect, what is their intersection?
7. If points A and B lie in plane M, what do you know about $\overleftrightarrow{AB}$?
8. Complete: Through points X, Y, and Z, there is _?_ one plane.
9. Complete in three different ways: _?_ are contained in exactly one plane.
10. Explain a plan for the following proof.

    Given: $\overrightarrow{OC} \perp \overrightarrow{AE}$;
    $\overrightarrow{OB}$ bisects $\angle AOC$;
    $\overrightarrow{OD}$ bisects $\angle COE$

    Prove: $\angle AOB \cong \angle DOE$



Chapter Summary

1. The concepts of *point, line,* and *plane* are basic to geometry. These undefined terms are used in the definitions of other terms.
2. $\overleftrightarrow{AB}$ represents a line, $\overline{AB}$ a segment, and $\overrightarrow{AB}$ a ray. AB represents the length of $\overline{AB}$; AB is a positive number.
3. Two rays with the same endpoint form an angle.