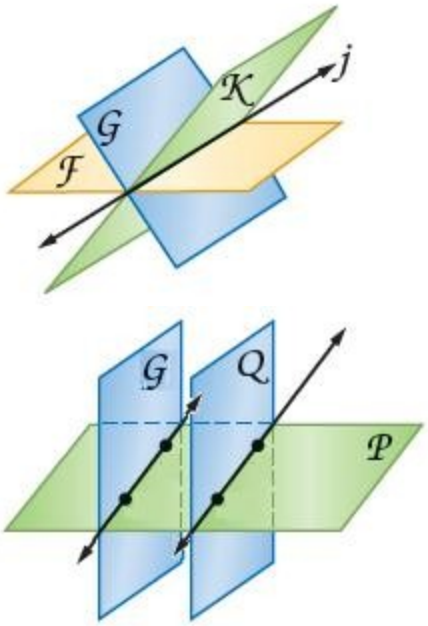
2-5 Postulates and Paragraph Proofs

Determine whether each statement is *always, sometimes,* or *never* true. Explain your reasoning.

7. The intersection of three planes is a line.

SOLUTION:

If three planes intersect, then their intersection may be a line or a point. Postulate 2.7 states that two planes intersect, then their intersection is a line. Therefore, the statement is *sometimes* true.



8. Line *r* contains only point *P*.

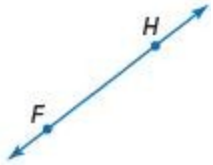
SOLUTION:

The postulate 2.3 states that a line contains at least two points. Therefore, line *r* must include at least one point besides point *P*, and the statement that the line contains *only* point *P* is *never* true.

9. Through two points, there is exactly one line.

SOLUTION:

Postulate 2.1 states that through any two points, there is exactly one line. Therefore, the statement is *always* true.



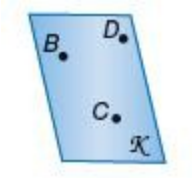
2-5 Postulates and Paragraph Proofs

Determine whether each statement is *always, sometimes,* or *never* true. Explain.

24. There is exactly one plane that contains noncollinear points *A, B,* and *C*.

SOLUTION:

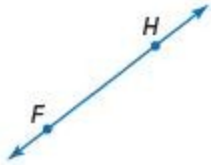
Postulate 2.2 states that through any three noncollinear points, there is exactly one plane. Therefore, the statement is *always* true.
For example, plane *K* contains three noncollinear points.



25. There are at least three lines through points *J* and *K*.

SOLUTION:

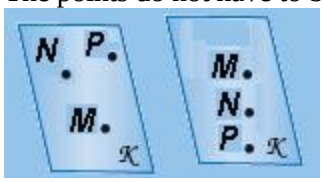
Postulate 2.1 states through any two points, there is exactly one line. Therefore, the statement is *never* true.



26. If points *M, N,* and *P* lie in plane *X,* then they are collinear.

SOLUTION:

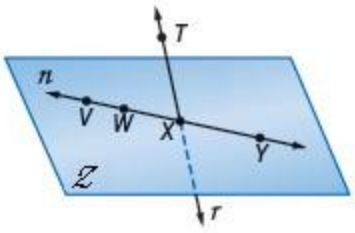
The points do not have to be collinear to lie in a plane. Therefore, the statement is *sometimes* true.



27. Points *X* and *Y* are in plane *Z*. Any point collinear with *X* and *Y* is in plane *Z*.

SOLUTION:

Postulate 2.5 states if two points lie in a plane, then the entire line containing those points lies in that plane. Therefore, the statement is *always* true. In the figure below, points *VWXY* are all on line *n* which is in plane *Z*. Any other point on the line *n* will also be on plane *Z*.

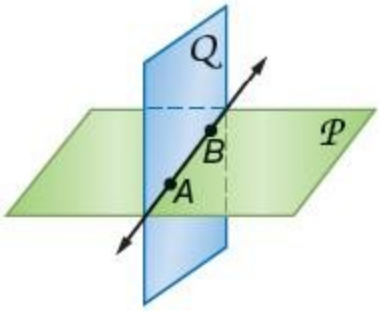


2-5 Postulates and Paragraph Proofs

28. The intersection of two planes can be a point.

SOLUTION:

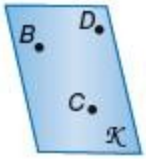
Postulate 2.7 states if two planes intersect, then their intersection is a line. Therefore, the statement is *never* true.



29. Points *A*, *B*, and *C* determine a plane.

SOLUTION:

The points must be non-collinear to determine a plane by postulate 2.2. Therefore, the statement is *sometimes* true.

Three non-collinear points determine a plane.  Three collinear points determine a line.