Lesson 4

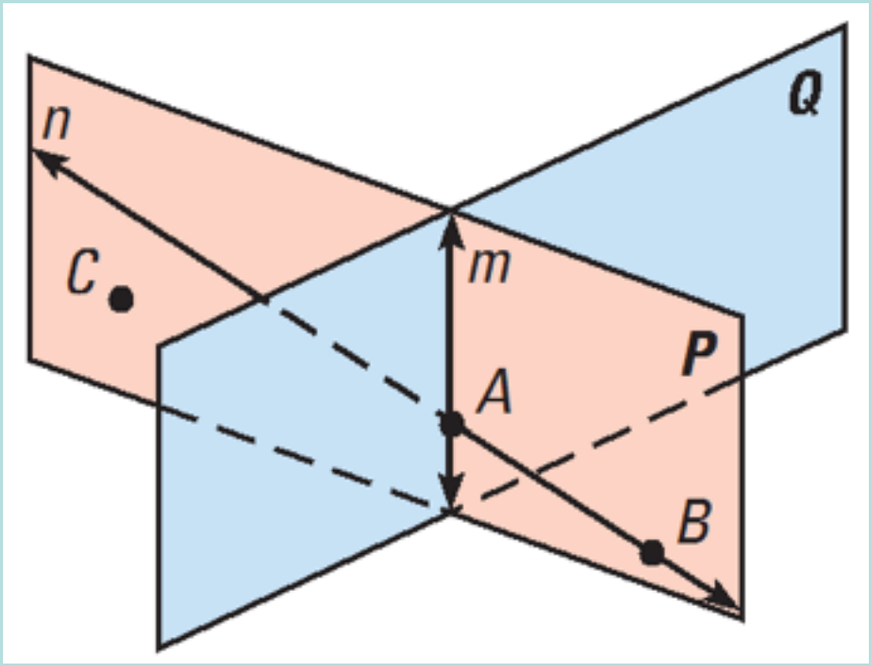
Postulates and Theorems About Points, Lines, and Planes

Postulate 5 Through any two points there is exactly one line.

Theorem 4-1 If two lines intersect, then they intersect in exactly one point.

Postulate 6 Through any three noncollinear points there is exactly one plane.

Postulate 9 A line contains at least two points; a plane contains at least three noncollinear points; space contains at least four noncoplanar points.



Ex. 1) Use the diagram to give examples of the postulates and theorems.

a. **Postulate 9**: A line contains at least two points.

example: Line n contains the points A and B.

b. **Postulate 9**: A plane contains at least three noncollinear points.

example: Plane P contains the three noncollinear points A, B, and C.

c. **Postulate 5**: Through any two points there is exactly one line.

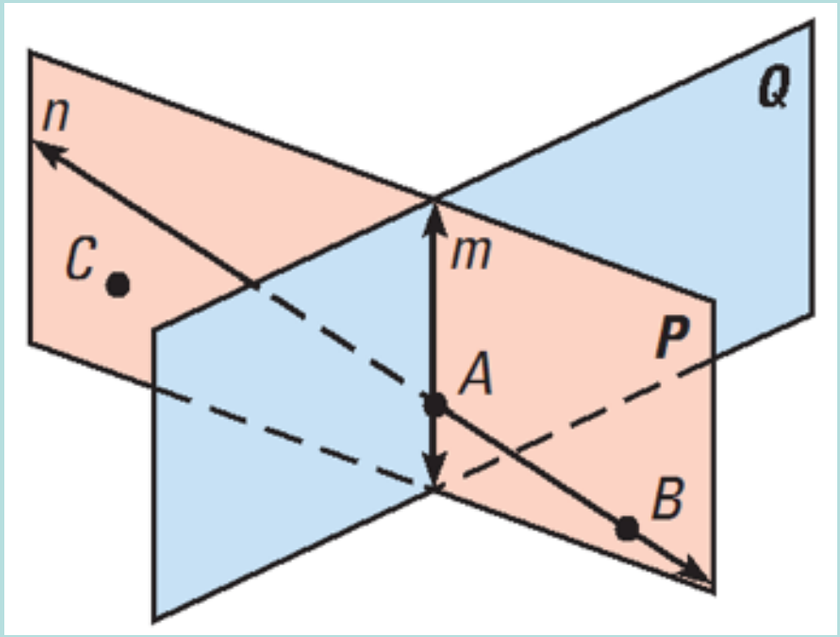
example: There is exactly one line, line n, that passes through the points A and B.

Theorem 4-2 Through a line and a point not in the line there is exactly one plane.

Theorem 4-3 If two lines intersect, then exactly one plane contains the lines.

Postulate 7 If two planes intersect, then their intersection is a line.

Postulate 8 If two points are in a plane, then the line that contains the points is in that plane.



Ex. 1 continued)

d. Postulate 7: Through any three points there is at least one plane, and through any three noncollinear points there is exactly one plane.

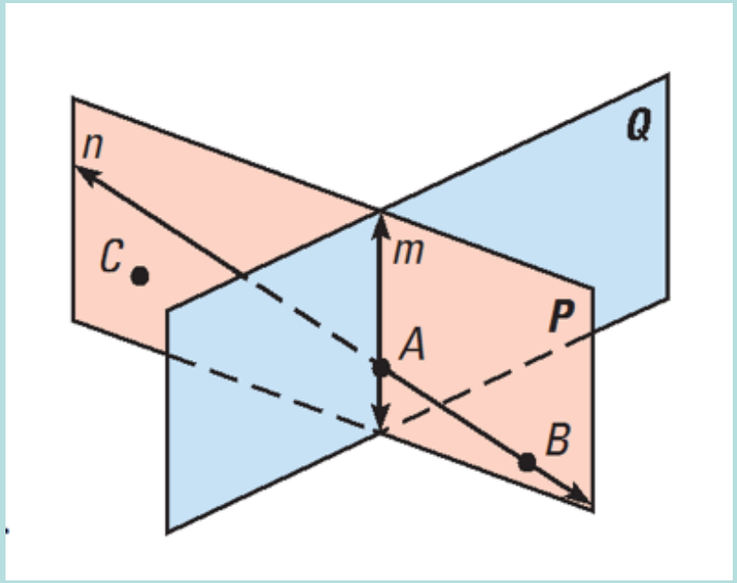
example: Plane P passes through the noncollinear points A, B, and C.

e. Postulate 8: If two points are in a plane, then the line that contains the points is in that plane.

example: Points A and B lie in plane P. So, line n, which contains points A and B, also lies in plane P.

f. Postulate 9: If two planes intersect, then their intersection is a line.

example: Planes P and Q intersect. So, they intersect in a line, line m.



Ex. 1 continued)

g. **Theorem 4-1**: If two lines intersect, then they intersect in exactly one point.

example: Lines m and n intersect in the point A.

h. **Theorem 4-2**: Through a line and a point not in the line there is exactly one plane.

example: Line n and point C, which is not in line n, are contained in one plane only, plane P.

i. **Theorem 4-3**: If two lines intersect, then exactly one plane contains the lines.

example: Plane P is the only plane that contains both intersecting lines m and n.