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ABSTRACT

This is one of a series of geometry modules developed for use by secondary students in a laboratory setting. The authors of this sequence of modules have chosen not to cover the initial basic postulates and theorems since they can be found in nearly every geometry text. Instead, a list of necessary postulates and their consequences is included. It is recommended that the individual instructor using this module sequence use a geometry text of his/her choosing to study the recommended postulates and theorems. After the postulates and theorems have been studied, attack the next module "Triangle Congruence." This module, therefore, gives the student an adequate experience in traditional Euclidean, deductive proof, and teachers should emphasize the nature and place of this power system in the development of geometry. (Author/MK)

GEOMETRY MODULE FOR USE

IN A

MATHEMATICS LABORATORY SETTING

TOPIC: Geometry to Parallels

by

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Geometry to Parallels

A fundamental basis for continuing with geometry is now manditory. The authors of this sequence of modules have chosen not to cover the initial basic postulates and theorems since they can be found in nearly every "old time" favorite geometry text. Instead, a list of necessary postulates and their consequences is included. We recommend that the individual instructor using this module sequence use a geometry text of his or her own choosing to study the recommended postulates and theorems. After the postulates and theorems on the following pages have been studied, gather your forces and attack the next module Triangle Congruence. From Triangle Congruence, you can move to the question of Parallelism.

This module, therefore, gives the student an adequate experience in traditional Euclidean, deductive proof, and teachers should emphasize the nature and place of this powerful system in the development of geometry.

Geometry to Parallels

-Outline-

Postulates

1. Two points determine exactly one line.
2. Distance Postulate: To each pair of distinct points there corresponds a unique positive number called the distance between the two points.
3. Ruler Postulate: The points on a line may be placed in a correspondence with the real numbers such that:
   a. To every point of the line there corresponds exactly one real number,
   b. For every real number there corresponds exactly one point on the line,
   c. The distance between two points is the absolute value of the difference of the coordinates of the points.
4. Every plane contains at least three noncollinear points. Space contains at least four noncoplanar points.
5. If a plane contains two points of a line, the plane contains the whole line.
6. Any three points lie in at least one plane, and any three noncollinear points lie in exactly one plane.
7. If two distinct planes intersect, their intersection is a line.
8. Plane Separation Postulate
9. Angle Measurement Postulate
10. Angle Construction Postulate (Protractor Postulate)
11. Angle Addition Postulate
12. Supplement Postulate

Theorems

1. If two lines intersect, they intersect in one point.
2. If a point lies outside a line, exactly one plane contains the line and the point.

Theorems

3. If two lines intersect, one plane contains both lines.

4. On a ray there is exactly one point at a given distance from the endpoint of the ray. (Point - Plotting Theorem)

5. Midpoint Theorem.

6. If two angles form a linear pair, the angles are supplementary.

7. In a half-plane, through the endpoint of a ray lying in the edge of the half plane, there is exactly one other ray such that the angle formed by the two rays has a given measure between 0 and 180.

8. An angle has exactly one bisector.

9. If two angles form a linear pair and have the same measure, then each is a right angle.

10. If two lines are perpendicular, then their union contains four right angles.

11. If two lines meet to form a right angle, the lines are perpendicular.

12. All right angles are congruent.

13. If two adjacent acute angles have their exterior sides in perpendicular lines, the angles are complementary.

14. In a plane, through a given point of a line, there is exactly one line perpendicular to the line.

15. If two angles are both congruent and supplementary, then each is a right angle.

16. Supplements of congruent angles are congruent.

17. Complements of congruent angles are congruent.

18. Vertical Angle theorem

19. Crossbar Theorem

20. Congruence of segments is an equivalence relation.

21. Congruence of angles is an equivalence relation.

This particular axiomatic development may be found in the following texts:

Anderson, Richard D., et. al., School Mathematics Geometry, Houghton Mifflin Company, Boston, 1969. Chapters 3,4, and 5.

Jurgensen, Ray C., et. al, Modern School Mathematics Geometry, Houghton Mifflin Company, Boston, 1972. Chapters 3 and 4.

Moise, Edwin E., Floyd L. Downs, Jr., Geometry, Addison - Wesley Publishing Company, Menlo Park, Calif., 1971, Chapters 3 and 4.