

1.3 Collinearity, Betweenness and Assumptions

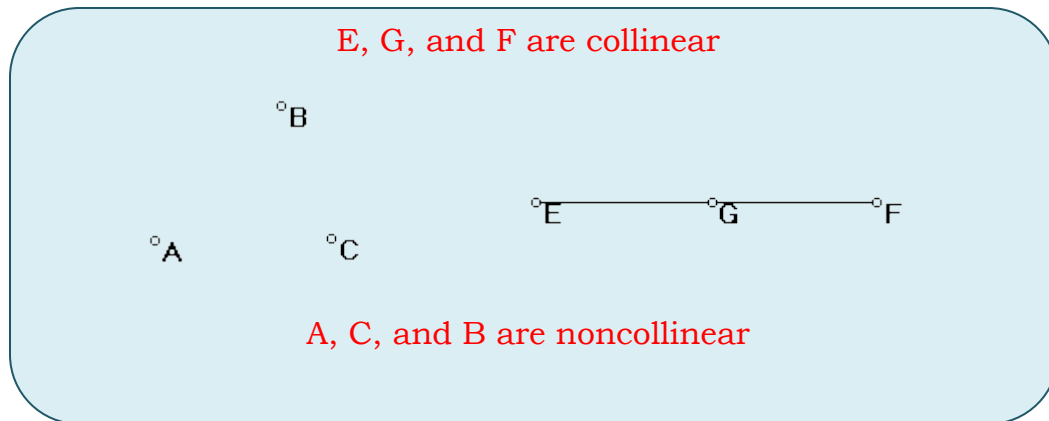
Lesson Objectives: After studying this section, you will be able to:

- Recognize collinear and noncollinear points
- Recognize when a point can be said to be between two others
- Recognize that each side of a triangle is shorter than the sum of the other two sides
- Correctly interpret geometric diagrams

Collinear – collinear points are points that lie on the same line.

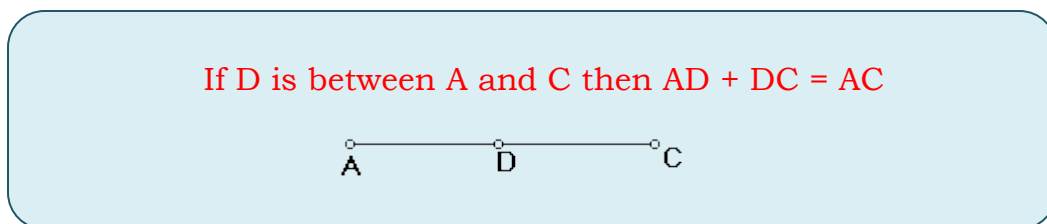
Note- Any two points are always considered to be collinear whether or not a line is shown in the diagram.

Noncollinear – points that cannot be contained on the same line are noncollinear.



Any two points are considered to be collinear even when a line is not shown. The key is they are able to be contained on the same line.

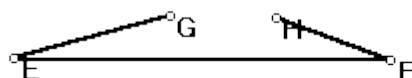
Betweenness – If a point is between two other points it must lie on the same line.



Postulate:

Triangle Inequality (*previewed in this section - from 15.2 and proven later*) -

The sum of the measures of any two sides of a triangle is ALWAYS greater than the measure of the third side.



If the sum is not greater than the third side, the two sides will not meet and form a triangle.

When two sides of a triangle are given, and you must find the possible length of the third side, follow this rule:

RULE:

The third side of the triangle must always be greater than the difference between the two given lengths, and less than their sum.

HINT: Write the following inequalities:

$$4 + 9 > x \quad \dots x < 4 + 9 \quad \dots x < 13$$

$$4 + x > 9 \quad \dots x > 9 - 4 \quad \dots x > 5$$

$$9 + x > 4 \quad \dots x > 4 - 9 \quad \dots x > -5 \quad (\text{reject negative!})$$

Then combine into a conjunction:

$$5 < x < 13$$

Example Explanation: If two sides of a triangle are 4 and 9, the third side must be greater than 5 (because $9 - 4 = 5$), and less than 13 (because $9 + 4 = 13$).

Assumptions from Diagrams, or how to interpret a diagram!

The most important part of this lesson is

to understand what you may and may not

ASSUME

from a given diagram.

You MAY ASSUME the following:	You MAY NOT ASSUME these:
Position of points (collinear or noncollinear and betweenness)	Congruent angles and segments (unless they are marked)
Straight angles	Right angles
Straight lines	Relative size of angles or segments

Examples using only the given diagram:

Assumptions that CAN be made:

$\angle BFC$ is a **straight angle** and A, B, and C are **noncollinear**,

Assumptions that CANNOT be made: $AD = DB$ or that $\angle AFB$ is a **right angle**

