

10-7 Locus Problems

Objective: Describe the locus that satisfies more than one given condition.

The plural of locus is loci. In the following problems, we are given two or more conditions and must describe the locus that satisfies all of these conditions. Usually, this locus is the intersection of the loci that satisfy each condition.

Example

Given two points, A and B . What is the locus of points in a plane containing A and B 1 cm from A and 2 cm from B ?

Solution

A and B mean any two points, so you need to consider all possible placements with A and B in the same plane.

Analyze the problem one condition at a time.

The locus of points 1 cm from A is $\odot A$ with radius 1 cm.

The locus of points 2 cm from B is $\odot B$ with radius 2 cm.

The locus of points satisfying both conditions is the possible intersections of the circles. There are three possibilities for the locus, depending on the distance between points A and B .



$1 \text{ cm} < AB < 3 \text{ cm}$

The circles intersect in 2 points.



$AB = 3 \text{ cm}$

The circles intersect in 1 point.



$AB = 1 \text{ cm}$



$AB > 3 \text{ cm}$

The circles do not intersect.



$AB < 1 \text{ cm}$

The locus is 2 points, 1 point, or 0 points.

Exercise 1 refers to locus in a plane.

- Consider the following problem: Given perpendicular lines j and k , what is the locus of points 2 cm from j and 3 cm from k ?
 - The locus of points 2 cm from j is ?
 - The locus of points 3 cm from k is ?
 - Draw a diagram to show the points that satisfy conditions (a) and (b).
 - Give a one-sentence solution to the problem.

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