Title: On certain Diophantine equations concerning the areas and perimeters of rational triangles

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In this work, we consider the following two Diophantine problems that arise from the search of pairs of rational triangles whose areas and perimeters are in certain relations. The first problem is about finding pairs of rational triangles whose products between area and perimeters are the same. The second one is to find the pairs of rational triangles sharing the same perimeter and whose product of areas is a perfect square. We show that if certain elliptic curves have rational points which satisfy some conditions, then there are infinitely many pairs of such triangles.

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