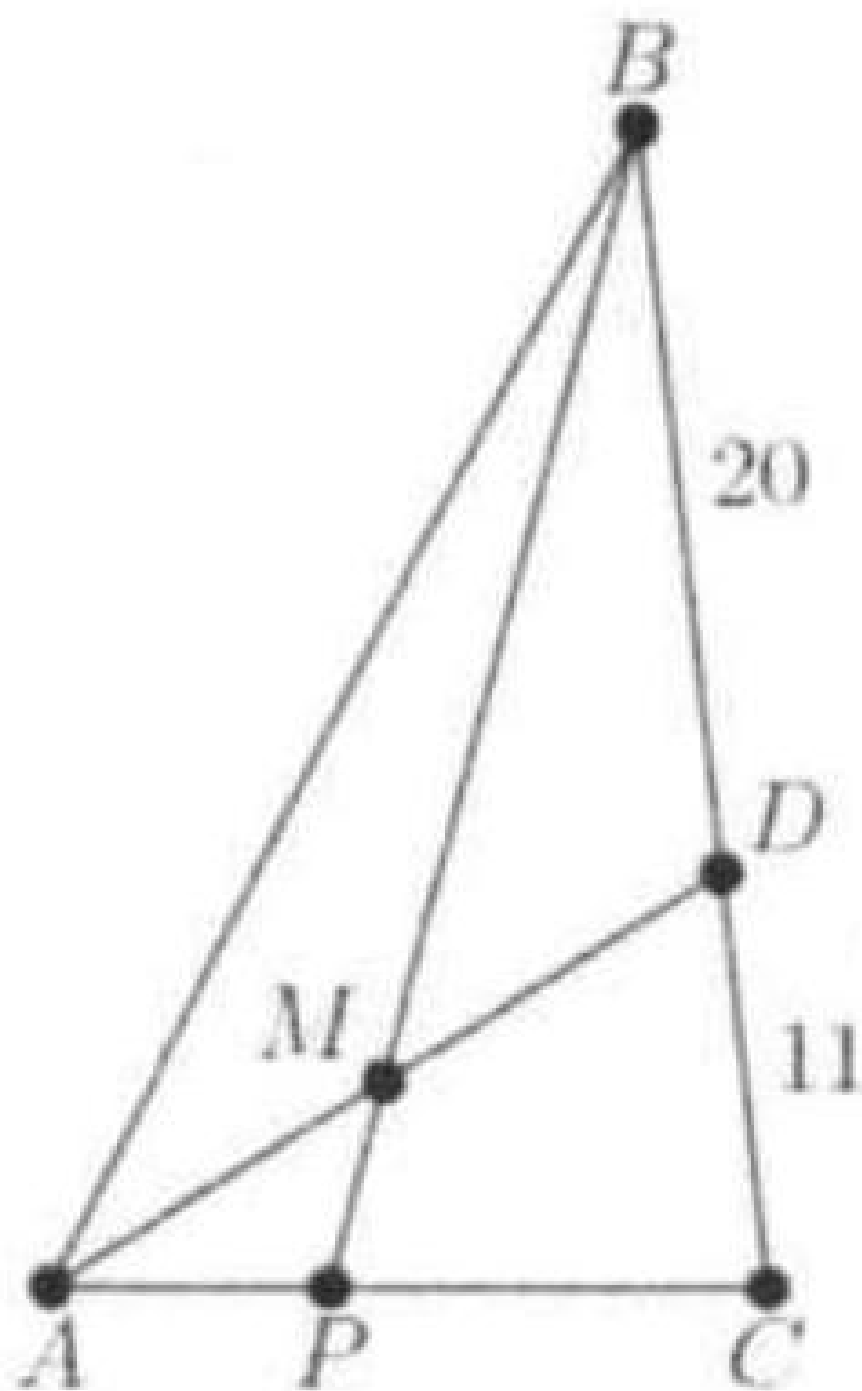


Problem

(2011 AIME II) In triangle ABC , $AB = \frac{20}{11}AC$. The angle bisector of $\angle A$ intersects BC at point D , and point M is the midpoint of AD . Let P be the point of the intersection of AC and BM . The ratio of CP to PA can be expressed in the form $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.



Solution

51. Through D draw a parallel to line BP intersecting line AC at Q . Then $PQ = 20k$, $QC = 11k$, and $PA = 20k$, using the Angle Bisector Theorem and the fact that 3 or more parallel lines divide all transversals in the same proportions. Thus $\frac{CP}{PA} = \frac{20K+11K}{20K} = \frac{31}{20}$. $m + n = 31 + 20 = 51$.

