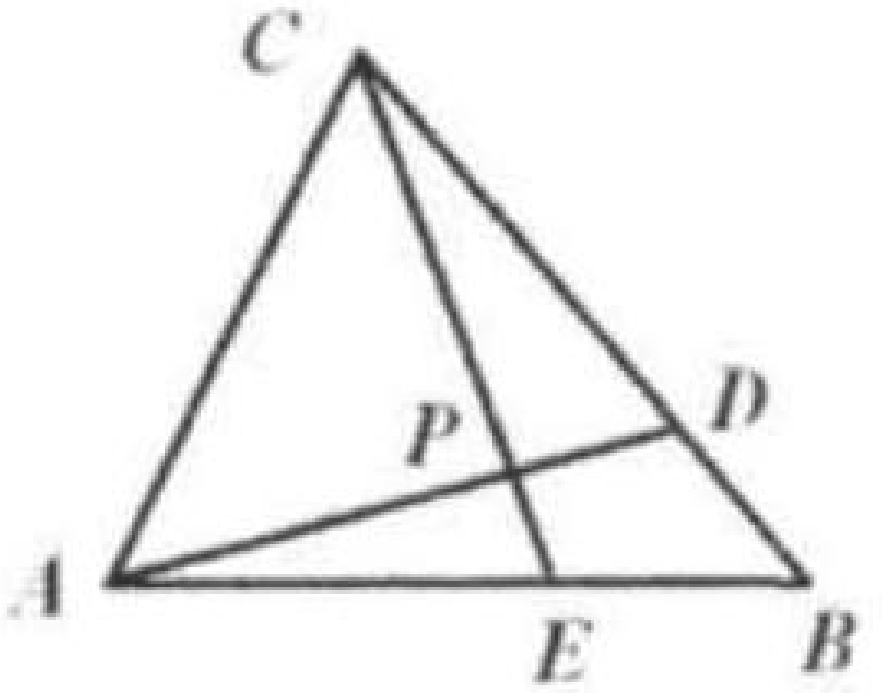
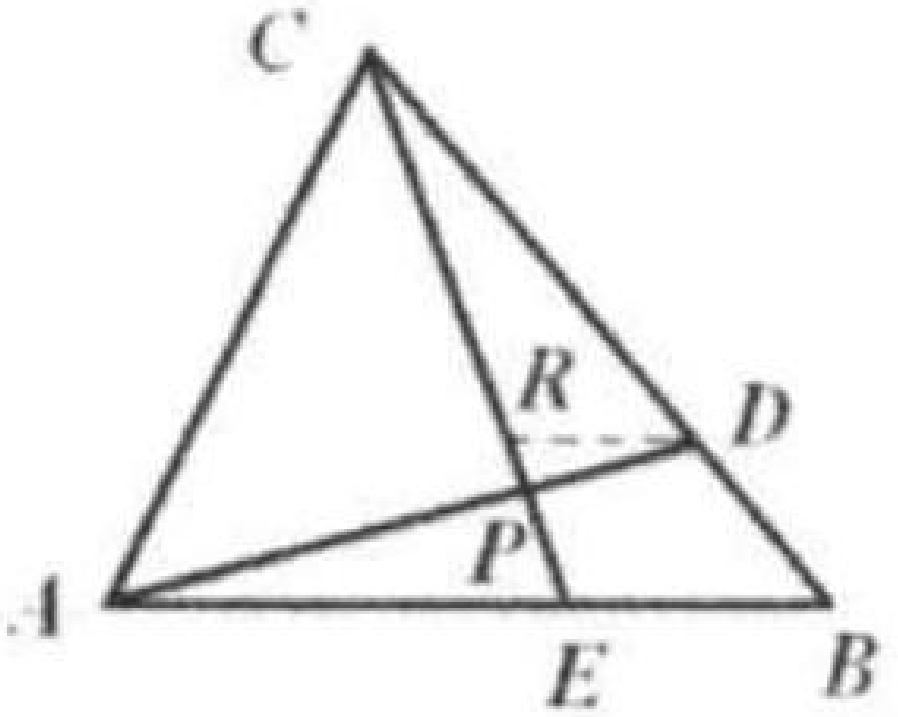
Example 7

(AMC) In triangle ABC lines CE and AD are drawn so that $\frac{CD}{DB} = \frac{3}{1}$ and $\frac{AE}{EB} = \frac{3}{2}$. Let $r = \frac{CP}{PE}$, where P is the intersection point of CE and AD. Then r equals:

(A) 3
(B) $\frac{3}{2}$
(C) 4
(D) 5
(E) $\frac{5}{2}$



Solution: (D).
Draw $DR//AB$. $\frac{CR}{RE} = \frac{CD}{DB} = \frac{3}{1}$, $\frac{RD}{EB} = \frac{CD}{DB} = \frac{3}{4}$;
$\therefore CR = 3RE = 3RP + 3PE$ and $RD = \frac{3}{4}EB$,
$\therefore CP = CR + RP = 4RP + 3PE$



Since $\triangle RDP \sim \triangle EAP, \frac{RP}{PE} = \frac{RD}{AE}, \quad \therefore RD = \frac{RP \times AE}{PE}.$
$\therefore RD = \frac{RP}{PE} \cdot \frac{3}{2}EB. \therefore \frac{3}{4}EB = \frac{3}{2}EB \cdot \frac{RP}{PE}, \quad \therefore RP = \frac{1}{2}PE,$
$CP = 4 \cdot \frac{1}{2}PE + 3PE = 5PE; \therefore \frac{CP}{PE} = 5.$