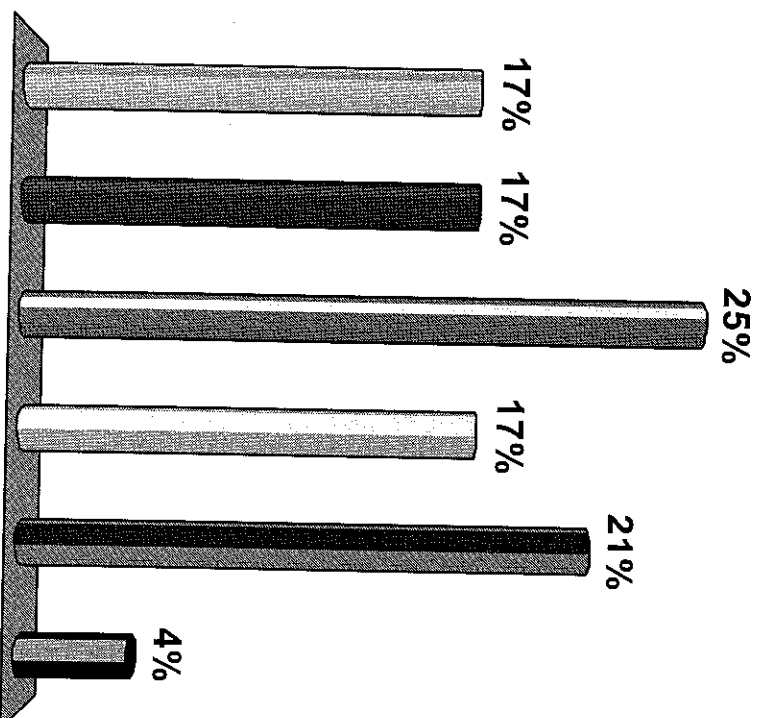


Given that an object with velocity v' in the x' direction in a frame, S' (which frame is moving with speed V in the x direction in the S frame of observer, O) will have in S the velocity: $v = (v' + V)/(1 + v'V/c^2)$, calculate v when $v' = 0.99c$, and $V = 0.99c$. The value of v is, most nearly,

- a) $v = 2.0 c$
- b) $v = 1.98 c$
- c) $v = 1.0 c$
- ✓ d) $v = 0.99995c$
- e) $v = 0.995 c.$
- f) $v = 0.99 c$



The most nearly correct answer is

d) $0.99995c$; as follows.

- Compute directly from the given formula:
- $v = (v' + V)/(1 + v'V/c^2)$
- $= (0.99 + 0.99)c/(1 + (0.99 * 0.99)c^2/c^2)$
- $= 1.98c/(1 + 0.9801)$
- $= 0.999949 c = 0.99995c$, most nearly: The correct answer is d).
- (Note that the velocity never quite reaches c , no matter how close the two added velocities are to c : Try the case $v' = V = 1 - \epsilon$ by inserting v' and V algebraically and checking for $\epsilon \rightarrow 0$.)