

4. The time it takes for a soldier in the rear end of the column to switch from the left to the right foot to stride forward is  $t = 1 \text{ min}/120 = 1/120 \text{ min} = 0.5 \text{ s}$ . This is also the time for the sound of the music to reach from the musicians (who are in the front) to the rear end of the column. Thus the length of the column is

$$l = vt = (343 \text{ m/s})(0.5 \text{ s}) = 1.7 \times 10^2 \text{ m} .$$