12 A school laboratory has dimensions 10 m × 3.0 m × 4.0 m. The laboratory contains 5000 moles of air, with a molar mass of 29 g, at an atmospheric pressure of 1.0×10^5 Pa.

What is the root-mean-square (r.m.s.) speed of the gas molecules in the air?

A $16\,m\,s^{-1}$ **B** $290\,m\,s^{-1}$ **C** $500\,m\,s^{-1}$ **D** $2.5 \times 10^5\,m\,s^{-1}$