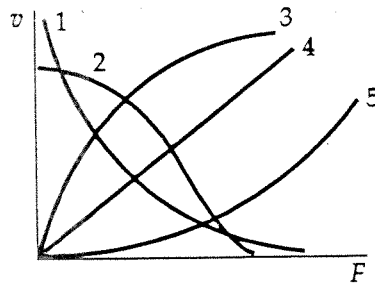


1. Which curve best illustrates the variation of wave velocity with tension in a vibrating string?

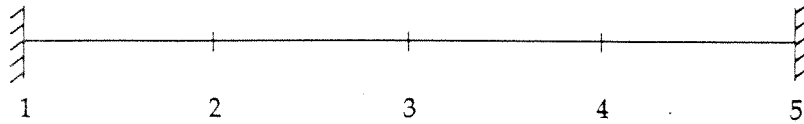
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5



2. State the principle of superposition for two waves propagating in the same medium. Explain the meaning of all symbols in it.

3. A stretched string is fixed at points 1 and 5. When it is vibrating at the second harmonic frequency, the nodes of the standing wave are at points

- (a) 1 and 5.
- (b) 1, 3 and 5.
- (c) 1 and 3.
- (d) 2 and 4.
- (e) 1, 2, 3, 4 and 5.

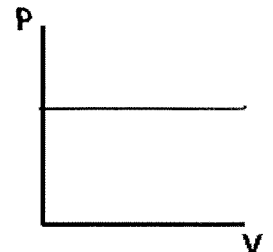
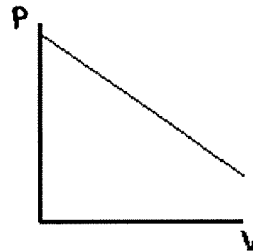
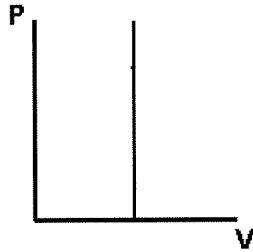
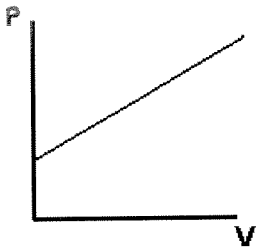


(Complete the diagram to prove your answer.)

4. Assume that oxygen (O_2) is an ideal gas and that the volume of a cylinder containing 24.088×10^{23} molecules of oxygen is constant. The pressure inside the cylinder is 208 atm at $85^\circ C$. What is the pressure of the oxygen when it is cooled to $-55^\circ C$?

5. Consider a PV diagram containing the graph of a function.
(a) What is the geometric interpretation of work?

- (b) Tell whether the work (W) is $W < 0$, $W = 0$ or $W > 0$ for the following graphs.



6. A device operating in a cycle would violate the second law of thermodynamics if it
- changed all heat from a source to mechanical work.
 - changed all of its mechanical work into heat.
 - were irreversible.
 - operated between two isotherms and two adiabats.
 - were less efficient than a Carnot engine.