

11. A volume of air at 60° Fahr. and 30 inches pressure contains 100 cubic inches ; what is its volume at 90° , and pressure 29.5 inches ?
12. Some air being left in a barometer tube 33 inches long, it is found that the mercury in it stands at 29 inches when in a perfect barometer it is at 30 ; find the altitude in the imperfect instrument when that in the perfect is 25 inches.

SECOND PAPER.

1. State Kepler's laws and the inferences immediately deducible from them.
2. Describe Foucault's experiment proving the rotation of the Earth on its axis, and state the hourly motion of revolution of the swinging ball in any latitude.
3. Give the lengths of a *Sidereal*, a *Mean Solar* day ; a *Sidereal*, *Tropical*, *Anomalistic* year. Explain generally the differences between these periods.
4. Give the *Sidereal* and *Synodic* periods of revolution of the moon, and give the reason of the difference.
5. How do Refraction and Parallax vary ? Prove the law of variation in each.
6. State generally the cause, and phenomena, of the tides.
7. Mention the principal Theories according to which Magnetic phenomena may be explained.
8. State the laws of current attractions and repulsions. What is the law of squares ?
9. State Ohm's law, and prove some of the conclusions which follow from it as to the proper arrangement of batteries, and their connections, for particular purposes.
10. What is the direction of the earth's current, and how is the current itself accounted for ?
11. An iron core is surrounded by a helix through which an electric current passes ; assume a direction for the current, and shew by a sketch the polarity excited in the bar.