

8. In an ordinary derrick, with a double pulley, the axle being 6 inches in diameter, determine what weight can be just sustained by a pressure of 100 lbs. on the end of the windlass, which is 3 feet long.

9. Find the magnitude and direction of the resultant of three forces of 1, 5 and 9 lbs., acting in directions mutually including an angle 120° .

Hydrostatics.

1. What is the pressure at a point in a liquid?

2. Prove that the pressure is the same at every point in a horizontal plane in a liquid.

3. Describe an experiment for determining the pressure at any point of a liquid.

4. Find the pressure on the base of a vessel 6 inches in diameter and 2 feet 6 inches deep filled with water, when the barometer stands at 29.045 inches.—Sp. G. Mercury 13.568.

5. State and explain the conditions under which a body floats in a liquid, and distinguish the total pressure and the resultant pressure on the submerged portions of the body.

6. What is the specific gravity of a body?

Describe Nicholson's Hydrometer, and explain how the specific gravity of a body lighter than water can be determined with it.

7. A body floats in water with $\frac{1}{8}$ of its volume submerged, and in a certain liquid with $\frac{1}{4}$ of its volume submerged, determine the specific gravity of the liquid.

8. State and explain Boyle's Law.

9. Describe, illustrating by diagrams, three of the following:—Braunoh's Press, the common pump, the barometer, the air pump, and the syphon.

LATIN AUTHORS—ARTS AND MEDICINE.

Examiner—William Dale, M.P.

Time—Two hours.

NOTE. — Candidates for Medicine will omit II. All candidates, except those for scholarships, are allowed an option between the 4th and 5th questions of each group.

I.

Translate: Helvetii repentino eius adventu . . . ex calamitate populi Romani et in-

ternicione exercitus nomen caperet aut memoriam proderet.

1. Parse, explaining the syntax of each word: *ituros, reminisceretur, didicisse, insidiis, constitissent*.

2. Comment on the following constructions: *bello Cassiano; virtuti tribueret; cum Caesare egit; ne committeret ut . . .*

3. Compare *aegerrime, vetus, pristinus, magis, conscius*.

4. *Bello Cassiano*. Give an account of this with date.

5. Define the position and give the modern names of *Sequana, Matrona, Arar, Arverni, Santoni*.

II.

Translate: *Etenim, si mecum patria, . . . si propter invidiam aut alicujus, periculi metum salutem civium tuorum negligis*.

1. Parse *comperisti, patiere, extulit, alicujus, negligis*.

2. Explain the difference between *ne, nonne, an, num*, when used in direct interrogations.

3. *si . . . loquatur: si . . . negligis*. Explain clearly the reason for the difference in mood.

4. *An leges . . . rogatae sunt*. Give an account of them with dates.

5. *Praeclaram vero . . . extulit*. Write a brief comment on this passage with dates.

II.

Translate:

*Hoc primum in luco . . .
 . . . umectat flumine voltum.*

1. Explain clearly the meaning of *fortuna, operum laborem, sacrum ambobus Achillem, sunt lacrimae rerum, pictura inani*.

2. Explain, with examples, the syntax of *dum*.

3. Translate the following lines, explaining the use of the subjunctive mood:

*Ardentesque avertit equos in castra, prius quam
Pabula gustassent Troiae Xanthumque bibissent.*

4. Scan the first three lines of the extract, marking the quantity of each syllable, and show the difference between *caesura* and *caesural pause*.