apparatus. Quantities per head required for private supply purposes. Rainfall, flow of water, and calculation of velocities in channels and pipes. Hydraulic rams, pumps, and compressors for raising water.

Hot-water Supply.—Systems of supply, and arrangement for best results; safety arrangements, the cause and prevention of collapse of cylinders and boiler-explosions; cause of incrustation in pipes, boilers, cylinders, &c.; the different forms of safety-valves; the relation between temperature and pressure. The expansion of water by heat; general principles of conduction, convection, and radiation; circulation of water in pipes and boilers; cylinder and tank systems of domestic hot-water supply; range and independent boilers; materials for cocks and valves; packing for manholes, and coatings to prevent loss of heat by radiation; simple hot-water systems of heating.

Sanitary Appliances and Drainage Fittings.—Forms and materials for baths, lavatories, sinks, urinals, water-closets, and their fittings and methods of fixing. Forms and principles of the various traps used in plumbers' work and their relative advantages; causes and prevention of waving out and siphonage of traps. The fitting-up, arrangement, and ventilation of soil and waste pipes, and their connection with drains. Drainage fittings of cast iron and stoneware, their respective forms and uses, and methods of jointing them. Preservative coatings for iron pipes and fittings, and their methods of application.

The arrangement and fixing of sanitary and water fittings in dwelling-houses, hospitals, and public buildings; ventilation of apartments in which sanitary applicances are fitted; setting-out, construction, and principles of town and country house drainage; storm overflows; sewage gases and ventilation of drains. Methods of sewage-disposal for isolated country houses; access to and cleansing of drains; the testing of soil-pipes, drains, &c., by smoke, water, chemicals, or air-pressure. Health Department's and local authorities' by-laws and regulations.

Plans and Specifications.—The preparation of specifications and quantities, and making working drawings to scale; measuring up work.

(b) Practice.

Breaks; lead-burning; 2 in. to 4 in. pipe bending; 2 in. to 4 in. pipe preparation and wiping of upright, horizontal, and branch joints; fixing of soil and waste pipes and connecting up with sanitary fittings; erection of sectional cast-iron boilers; repairs to W.C. cisterns, flushing-valves, automatic cisterns; testing of soil-pipes and drains; taking of levels and setting out for drains, &c.; bending of iron and copper pipes; fitting-up of sanitary appliances, also special fittings; testing of water fittings; inspection of heating installations; preparation and wiping of joints; lead-burning.

The examination will be of an advanced character, and will be such as to show that the candidate can properly bend lead pipes of all sizes, and join them by wiped soldered joints, without the use of lamp or gas-jet, or by lead-burning, in such positions as would occur in practice; and boss lead, to a given form, or execute in a satisfactory manner any other piece of plumbing-work in other metals referred to in the above syllabus.

Before being admitted to the examination the candidate must produce, where possible, a certificate signed by the local Apprenticeship Committee in the plumbing trade to the effect that the candidate has reached a satisfactory standard in the range of work specified in the syllabus in a workshop approved by the committee as efficiently conducted:

ENGINEERING TRADES.

Preliminary Examination.

Candidates must produce evidence of having reached a satisfactory standard in English and elementary calculations. No special examination will be set in these subjects, but candidates' papers which do not reach a satisfactory standard in these subjects will fail him on this ground alone. It is strongly recommended that the English course followed by apprentices shall include wide practice in the lucid and accurate description of common objects and the study of technical terms used in engineering.

The following candidates will be exempted from the preliminary examination:—

(*a*) Those candidates who have passed the examination for a senior free place in the subjects of trade drawing, freehand and instrumental drawing, mathematics, or alternative mathematics, general experimental science, and metalwork.