Appendix.

Place an iron rod with its ends on two bricks (or wooden blocks); drive a nail into one brick to prevent the rod from slipping. On the other brick place a piece of steel wire or a darning-needle at right angles to the rod, so that the end of the rod rests upon the wire, which is free to turn round. At one end of the wire, at right angles to it, attach a thin piece of straw or a fine splinter of wood. Find how many revolutions the straw makes when the rod is pushed on one inch. (Use a protractor to measure the angle or fraction of a revolution.) Set light to some methylated spirit in a narrow tin dish placed under the rod, and note the greatest expansion that takes place.

Repeat the experiment with a brass or copper rod, using the same amount of spirit.

Take an ordinary screw-wrench or spanner and a brass curtain-ring or a penny. Adjust the screw so that the ring or penny will just pass between the jaws of the wrench. Heat the ring or penny, and then try to make it pass through the jaws.

Fit a flask with a stopper and glass tube, and fill it with water (with which may be mixed a little ink or a solution of indigo). Heat the flask, and note the result.

Let the flask cool. Pour out half the water, but let the lower end of the glass tube be below the surface of the water. Heat the flask again, and note the result. Why does the water in the tube rise higher than before?

Let the flask cool. Pour out all the water, and fit the stopper with a narrow tube bent at right angles. Attach the open end of the bent tube by rubber to the open U tube used before. In the U tube place some water or mercury. Heat the flask, and note the result.

Repeat the last three experiments, putting a thermometer into the flask. Note the readings of the thermometer.

What is the temperature of the air in the room? of the water from the tap? of the air outside? in the sun? What temperature is shown when the thermometer is held inside your mouth?

Find the temperature of the steam immediately above the surface of boiling water.

Find the temperature of melting ice.

Put some pieces of ice into water. Why do they float?

Into the jar used for measuring volumes put some water cooled, say, to about 40° Fahr. and a piece of ice, as large as possible, enclosed in enough wire netting or perforated zinc to make it sink. Note the temperature and volume. Watch the change in temperature. Wait until the water is at freezing-point. When the ice has just melted, note the temperature of the water and the volume.

Melt a piece of candle gently in a test-tube; find the temperature when the candle is nearly all melted. When it is completely melted, throw in one or two small pieces of the same candle. Do they float or sink? Why?

To this course may be added experiments to explain conduction, radiation, and convection of heat; ebullition, evaporation, distillation, condensation of vapour; the formation of clouds, rain, and dew; the principles of ventilation.

Daily readings of the thermometer should be taken, and a record kept. Use maximum and minimum thermometer for this purpose if possible.

There might also be included in the course experiments to explain the composition of air and water, and the process and products of combustion; solutions and the change of temperature when, say, common salt or ammonium-nitrate is dissolved in water; filtration; the action of acids on carbonates, and of expired air upon lime-water, &c.

[The work thus indicated might be taken up in classes S5 and S6 as one of the courses of elementary science prescribed by the Regulations for Manual and Technical Instruction.]

Elementary Science in Country Schools.

The following rough notes are given as an indication of the topics from which there may be selected subjects for a course of lessons suitable for the upper classes of a country school.

Preliminary Work.—It is presumed that in the earlier standards lessons on objects will have been given with the purpose of teaching children to observe carefully and intelligently the simpler facts of animal and plant life as it may be seen around them, and that these lessons will have been grouped systematically so as to include, for instance, some of the following subjects: Man, rabbit, sheep, cow, horse, pig, dog, cat; fowl, duck, pigeon, sparrow, lark, blackbird, starling, one or more of the native birds of New Zealand; frog; eel, trout, rock-cod, sole; crab, crayfish, snail, oyster; spider, butterfly, beetle, &c.; bean, pea, sow-thistle, oat or wheat, ryegrass, cocksfoot, potato, rose, lily, sunflower, carrot, turnip; fern, moss, mushroom, mildew, yeast; gorse or broom; New