2. Describe necessary precautions to be observed in approaching old workings known to contain dangerous accumulations of water. Give sketches showing how work carried on.

3. Assume dam 10 ft. by 7 ft., head of water 600 ft.: what would the pressure be per square inch, and what would the total load on the dam be?

SUBJECT No. 12.—*Blasting, and the Use of Explosives.*

1. Briefly describe what you consider the safest explosive for use in coal-mines.

2. State your reasons and explain what precautions you would take to prevent shots blowing out.

3. Describe duty of shot-firer and generally the precautions to be adopted regarding the firing of shots, more especially in mines known to give off firedamp and which are dry and dusty.

SUBJECT No. 13.—*The Effect of Faults on Coal-seam. How to ascertain Direction of a Seam of Coal when dislocated by Fault.*

1. Show by sketches the effect produced by faults—
   (*a.*) Downthrow;
   (*b.*) Upthrow;
   (*c.*) Overlap or reverse fault.

2. Describe a typical case, and what steps you would adopt to recover the seam.

3. What is the meaning of the term "intrusive rock," and what effect has such on coal-seams?

4. A seam of coal dips at the rate of 6 in. per yard when a downthrow fault of 50 ft. is met: how far would it be necessary to drive at 9 in. per yard dip before cutting coal-seam again?

SUBJECT No. 14.—*A Knowledge of the Different Classes of Coal, and of the Character of the Rocks and of the Formation of Country where Coal likely to be proved.*

1. State in which formation coal is generally found, and describe character of same.

2. What is anhydrous coal? Is there true coal found in New Zealand? If so, where?

3. Describe the rocks you consider to be indicative of the existence of coal in your district, giving a section.

4. Enumerate the several kinds of coal, and state the elements chiefly objectionable in coal, and why so.

SUBJECT No. 15.—*A Knowledge of Underground Surveying and Making of Plans showing System of Working, Inclination of Seams, Faults, and Course of Ventilation.*

1. Candidate must produce plan showing the system of working in a colliery, with the surface for at least 20 acres in the vicinity of the shaft and the underground workings in different-coloured ink. The connection between the surface and underground must be described in the event of there being only one shaft. The levels and main headings must have assumed traverse calculated in detail, and showing latitude and departure of each bearing.

2. In using the magnetic needle what precautions have you to observe in surveying and plotting?

3. Sketch as accurately as possible the following bearings, and calculate the latitude and departure, and give the course and length of the seventh set to tie with the start of the first set:—
   No. 1—S. 47·00° E., 340 links.
   No. 2—S. 79·30° W., 160 links.
   No. 3—S. 30·45° E., 420 links.
   No. 4—N. 62·30° W., 710 links.
   No. 5—N. 41·00° E., 230 links.
   No. 6—N. 62·30° W., 340 links.

4. Describe system of levelling you are acquainted with, and show how to keep a level-book and reduce levels.

SUBJECT No. 16.—*Knowledge of Arithmetic and of keeping Accounts.*

1. What will be the cost of laying a single tram-line 500 yards, with rails 20 lb. per yard, cost £9 5s. per ton; sleepers 3d. each, laid every yard; fasteners, 5 cwt., at 16s. per hundredweight; and men are paid 4½d. per yard for laying?

2. A colliery produces per week 6,500 tons of screened coal and 1,250 tons of small; the wages-cost on total output is 5s. 6½d.: what is the cost per ton of large coal when it is debited with the entire wages expended and credited with the value of the small at 3s. 10½d. per ton?

3. Contractors deliver coal at the pit-bank at the rate of 4s. 3·85d. per ton: what rates should be paid (*a*) at an advance of 13¼ per cent., (*b*) at a reduction of 5¾ per cent.?

SUBJECT No. 17.—*A Knowledge of the Coal-mines Act.*

1. Describe provisions of the Coal-mines Act—
   (1.) With regard to ventilation;
   (2.) Regarding reports of accidents;
   (3.) Signals in shafts;
   (4.) The inspection of shafts and machinery.

2. What are the requirements of the Act as to fixing stations, duties of fireman, and use of explosives?

3. What are the duties of the manager in terms of the Act?

4. What are the provisions of the Act regarding the fencing of abandoned workings, providing refuge-holes, second outlet from mine, timbering and setting of sprags when holing, and approach to old workings?