

2. Explain the principle of a modern safety-lamp, and how you would determine the safe working-conditions of the mine when examining bord-and-pillar workings, with a safety-lamp, for gas.

3. What gases are given off by gob-fires? In a mine liable to spontaneous combustion, what special precautions would you adopt?

4. Ventilate the plan shown in question No. 6 of the first-class questions on ventilation, using the reference signs thereon to indicate your method.

5. In a bord, where a heavy fall has occurred, breaking down the brattice, gas has accumulated in the cavity: explain, and show by sketches, how you would clear away the gas and restore the place to working-order.

6. Give your reasons fully why it is necessary to maintain efficient ventilation in mines.

7. How is the volume of air circulating in mines usually ascertained? Show by a calculation how you would arrive at the total quantity passing in a mine.

SUBJECT 4.—*Dealing with Old Workings and other Sources of Danger.*

1. What precautions are necessary, and why, where you have extensive areas of old workings in a mine?

2. What dangers are possible to occur in mines where naked lights are used?

3. Enumerate the causes of creep, and show by sketches the effect of such in working-roads.

4. State the provisions you would make before and after shot-firing in a dry and dusty mine.

5. Accidents occur underground from various causes: what precautions would you adopt to lessen same?

6. If a district of your mine, in which safety-lamps are used, became suddenly fouled with explosive gas, what steps would you take?

SUBJECT 5.—*Mine Drainage and Haulage, and Appliances for same.*

1. Explain the different methods of mine-drainage, and give a description of what you consider the most efficient type of pump.

2. What is the use and advantage of a siphon; and what are the conditions necessary to enable it to work efficiently?

3. Describe the different systems of haulage, and state the conditions under which each system may be better applied than the others.

4. How would you lay out and equip a jig 5 chains in length and rising 1 in 8? Give your reasons, and illustrate by sketches.

5. Describe the various appliances in use for attaching tugs to haulage-ropes.

SUBJECT 6.—*Practical Elementary Electricity.*

1. Describe the application of electricity to underground signalling.

2. Describe as fully as you can a battery as used for shot-firing by electricity.

3. Name the principal parts of a dynamo, and their purpose.

4. What sources of danger can arise from the application of electricity underground?

5. What causes may operate to throw an electric signalling system out of working-order?

SUBJECT 7.—*Arithmetic, and a Knowledge of the Coal-mines Act, 1908, and its Amendments; also, First Aid to the Injured.*

1. Add together £523 11s. 10½d., £260 4s. 11½d., £23 4s. 3½d., 15s. 9½d., subtract £47 16s. 11½d., and divide the remainder by 19.

2. A miner earns 15s. 11½d. per shift for three pays of 14 days each: what are the total earnings, and how much would he receive for a similar period with an increase of 5 per cent.?

3. How many chains of single road will 10 tons of 9 ft. rails, 16 lb. per yard, lay?

4. A shaft-sump, 14 ft. diameter and 20 ft. deep, is full of water: how many gallons are there?

5. How many bricks would be required for a dam 8 ft. wide, 6 ft. high, and 4 ft. thick?

6. Briefly state the requirements of the Coal-mines Act, and amendments thereto, as to,—

- (a.) Special rules;
- (b.) Vertical shafts to underground furnaces;
- (c.) Water and boreholes;
- (d.) Ropes and chains.

First Aid.

1. How would you render first aid to a workman whose foot and leg were badly crushed by a fall of coal?

2. Name the different kinds of fracture, and how you would treat them.

3. What treatment would you give a person overcome by black damp?

4. Heavy bleeding oftentimes results from accidents: state some of the forms of such, and how you would treat them.