

SUBJECT 3.—*Ventilation : Ventilation of Mines and Knowledge of Mine Gases ; Spontaneous Combustion of Coal, and Methods of Dealing with Underground Fires ; Rescue Apparatus ; Practical Knowledge of Gas-testing with a Safety-lamp.*

1. What are the provisions of the Coal-mines Act with regard to the ventilation of coal-mines ?
2. What are the effects of atmospheric changes of temperature upon the ventilation of mines where powerful fans are in use ?
3. In a mine giving off a large quantity of fire-damp how would you ascertain if mine properly ventilated ?
4. The water-gauge being 1 in. and the volume of air in circulation 50,000 cubic feet per minute, what will be the volume of air in circulation if water-gauge increase to 1·6, the increase being due to increased power applied ?
5. What are the chief causes of mine-fires, and how would you proceed to guard against them ?
6. Describe what you consider a good type of oil-burning safety-lamp, having regard to testing for fire-damp and for use in the working-parts of a fiery mine.
7. Having to open out workings by driving two parallel headings giving off gas with a pillar of 20 yards thick between headings, show by sketches how you would conduct the ventilation so as to effectually prevent gas accumulating.

SUBJECT 4.—*Arithmetic and Law : A Knowledge of Mine Accounts ; Fractions, Decimals, Percentages, Square Root, Area of Rectangle, Trapezoid, Circle, &c. ; Measurement of Timber ; Calculation of Workable Coal in a Mine, &c. ; a Knowledge of the Coal-mines Act and Amendments.*

1. The shaft-pumps at a colliery raise 150 gallons a minute : if stopped 12 hours for repairs, what storage-room is required to hold the 12 hours' water ? Give answer in cubic feet.
2. For driving a roadway 8 ft. wide by 7 ft. high 45s. per yard is paid : what is the cost per cubic foot ?
3. Give length of straight line starting 80 ft. from the base to reach top of cliff 798 ft. high.
4. In one district of a colliery, working-hours 8 per day, 6 horses and 6 men are employed hauling coal to main rope ; each horse makes 12 trips, 4 tons per trip ; and allowing 9s. a day for each man, and 3s. 6d. a day for each horse, what is the cost per ton ?

*Knowledge of Coal-mines Act.*

1. State briefly the duties of the manager, underviewer, and firemen deputies under the Coal-mines Act, 1908, and amendments.
2. State the provisions of the law regarding (a) the storage and use of explosives, (b) the duties and responsibilities of shot-firers, (c) what the law provides should be attended to by the working collieries in regard to the safety of their working-places.