

SUBJECT 8.—*Practical Elementary Electricity.*

1. Describe the "low tension" and "high tension" systems respectively of electric shot-firing.
2. How many 50 c.p. lamps, taking 3·5 watts per candle, can be run off a dynamo giving 12 electrical horse-power?
3. Describe the armature, also the commutator, of a dynamo.
4. What are the things which affect the "resistance" of an electrical conductor?
5. What is a dynamo, and what is a motor?
6. Describe an electrical coal-cutting installation, and how you would operate same with a view to general safety in a gaseous mine.
7. What is "pressure-drop"? Also calculate what would be the P.D. for each 5 chains of a cable one mile in length, wherein a current of 80 amperes is flowing, and the resistance is 0·5 ohm per mile.

SUBJECT 9.—*Arithmetic, and a Knowledge of the Coal-mines Act, 1908, and Amendments; also, First Aid to the Injured.*

1. A property of 800 acres 3 roods 10 perches contained a seam of coal 7 ft. 6 in. thick: assume the area as having been exhausted, and 90 per cent. of the coal won, what would the royalty have amounted to at 6d. per ton? (30 cub. ft. = 1 ton.)
2. Six hundred and thirty tons of coal are taken from a heading 12 ft. wide and 9 ft. high: what is the distance driven if 1 cubic yard weighs 18 cwt.?
3. If the wages, stores, traction, and royalty on 300,000 tons of coal, selling at 11s. per ton, amount to £150,000, what is the profit after 7½ per cent. advance on the foregoing charges, and a rise of 1s. 3d. per ton in the selling-price?
4. From 5 acres of seam, having a S.P. of 1·25 and a thickness of 9 ft., the coal was won; the coal sold for 10s. per ton, and an average profit of 12½ per cent. was obtained: what was the amount of profit in money value?
5. A 10 in. delivery column of pipes, in a shaft 800 ft. deep, is full of water: how many gallons will there be; and what will be the total pressure on a 6 in. pump-plunger at that depth?
6. Briefly state the requirements of the Coal-mines Act, 1908, and its amendments, as to,—
 - (a.) Persons in charge of machinery;
 - (b.) Signalling;
 - (c.) Mines liable to flooding;
 - (d.) Appointing of stations;
 - (e.) Fencing of places;
 - (f.) Safety-lamps and lights.
7. Explain how you would render first aid with respect to the various forms of hæmorrhage resulting from accidents.
8. Enumerate the different kinds of fractures, and how you would treat them.
9. How would you treat cases of suffocation by gas?

**QUESTIONS ASKED AT THE 1910 EXAMINATION FOR SECOND-CLASS
CERTIFICATES OF COMPETENCY.**

SUBJECT 1.—*Prospecting, Boring, Shaft-sinking, and Opening out a Colliery.*

1. Describe the different methods of prospecting a coal-bearing area.
2. Describe the appliances used for shaft-sinking, and state how you would sink a shaft 15 ft. in diameter, knowing a bed of quicksand would be met 30 ft. from the surface.
3. Show by sketches how you would open out your main roads and workings from shafts 500 ft. deep, with the sinking only completed to the seam of coal.

SUBJECT 2.—*Working Coal, and Timbering Underground.*

1. Explain the conditions under which one system of working coal is preferable to another, having in view economy in working, also general safety.
2. Describe how you would determine the safety of a miner's working-place, relative to danger from roof and sides.
3. Show by sketches how you would timber a longwall face; an ordinary bord; also a main road, with fairly hard roof, at a depth of 600 ft.
4. Explain the methods and precautions you would adopt in driving a place through a heavy fall of roof.

SUBJECT 3.—*Mine-gases, Spontaneous Combustion, and Ventilation.*

1. State what you know of the gases usually found in coal-mines, how they are likely to be found, and the precautions necessary to deal with them.