

3. If a ventilating-fan is producing 40,000 ft. of air per minute with 20 horse-power, what horse-power will be required to produce 60,000 cubic feet, conditions in the mine remaining the same?
4. If 36,000 cubic feet of air is passing through an airway 6 ft. by 10 ft. under pressure of 3.6 lb. per square foot, what pressure will be required to pass the same quantity in an airway 5 ft. by 10 ft?
5. Give the chemical properties of pure air and also of fire-damp, and their comparative weights. If an explosion happened when there was a mixture of 9 of air to 1 of gas by volume, what would be the resultant gases and their properties?
6. State your experience, if any, in the working of mines subject to spontaneous combustion, and say what means you would adopt to localize such outbreaks so as to avoid affecting the output of the mine.
7. Describe any rescue apparatus of which you have knowledge.
8. Describe what is meant by "splitting the air," how doing so affects the general ventilation of a mine, and what are the limits to its adoption.
9. What in your opinion is the best means of avoiding dust-explosions in coal-mines? State generally the conditions under which the presence of the various mine-gases may be expected.

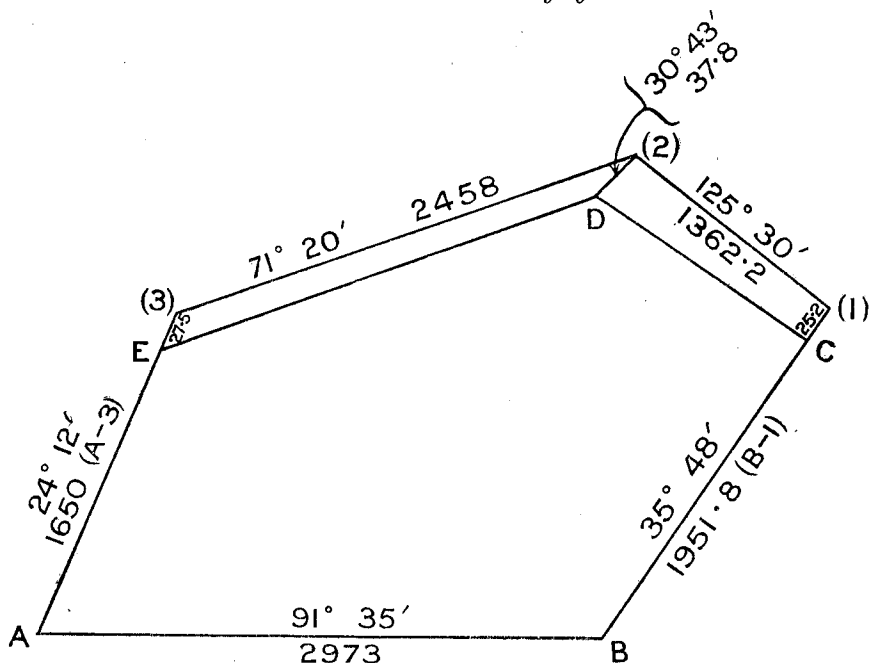
SUBJECT 4.—*Arithmetic and Law : A Knowledge of Mine Accounts ; Fractions, Decimals, Percentages, Square Root, Area of Rectangle, Trapezoid, Circle, &c. ; Measurement of Timber ; Calculation of Workable Coal in a Mine, &c. ; a Knowledge of the Coal-mines Act and Amendments.*

1. Assume output of mine to be 1,000 tons a day, 40 per cent. being large coal, 30 per cent. nut coal, and 30 per cent. slack; the gross cost of production at the mine totals £350, and the sale of large coal and nuts realizes £300: at what price would the slack have to be sold to realize 15 per cent. profit on the working?
2. Find the length of a straight line starting 80 ft. from the base to reach the top of a cliff 798 ft. high.
3. Find the depth of a circular tank, $10\frac{1}{2}$ ft. diameter, to contain 5,000 gallons.
4. What will be the length of the side of a square field (in yards to two places of decimals) containing 20 acres 2 roods 2 poles 20 square yards; and if a seam of coal 4 ft. thick underlies the field, how many tons of coal would be in it, the specific gravity being 1.25?

Knowledge of Coal-mines Act.

1. Briefly state the duties of the manager, underviewer, and fireman, and deputies under the Coal-mines Act, 1908, and amendments.
2. State what you know regarding the practical working of the rules relating to the use of explosives in coal-mines.
3. State what duties outside of coal-getting are to be attended to by coal-miners. Quote special rules referring to such.

SUBJECT 5.—*Surveying.*



1. The above diagram shows the survey of a mining claim, A B C D E: find the bearings and distances of the boundaries C D and D E. The distances are given in links.