

3. Calculate the area of the figure ABCDF.
4. Describe the "dip" and "strike" of a reef, and give diagrams.
5. Explain how you would transfer true bearing to the underground traverse in the case of only one shaft, and also when there are two.
6. Describe in their proper order the complete adjustments of a Y theodolite.

SUBJECT L.—*A Knowledge of the different Rocks where Gold, Silver, Tin, Copper, Zinc, Lead, and Antimony are found, and of the Formation of Lodes and Leads.*

1. Where do the following metals of commercial importance occur in New Zealand, and what is the nature of the rock in which the metals are found: Iron, copper, tin, and antimony?
2. What is the character of the rock enclosing the gold-bearing quartz veins in the following localities: Coromandel, Karangahake, Waihi, Blackwater, Reefton, and Skipper's?
3. What is meant by the terms "pay-streak," "ore-shoot" and "bonanza"?
- Give examples of each in mining localities familiar to you, and discuss how they have been formed.
4. Give an account of the gold-bearing veins of a New Zealand locality familiar to you, discussing their dimensions, their general trend, the nature of the enclosing rock, the minerals associated with the gold, and the distribution of the precious metals (whether in shoots or of uniform distribution).

QUESTIONS ASKED AT THE 1909 EXAMINATION FOR BATTERY-SUPERINTENDENTS' CERTIFICATES.

SUBJECT A.—*The Different Modes of reducing and pulverising Ore.*

1. State in what capacity you were employed in crushing-batteries where bullion was extracted by means of cyanide-solutions. Give the dates of your employment, and the battery superintendents you were under.
2. Describe the whole of the machinery, appliances, and plant required to treat with KCN solutions 90 tons of ore per day of 24 hours. In using stamps, give the weight and drop you would recommend; also state the maximum number of drops per minute the stamps would make without striking the cams, and give your reasons for same.
3. Show by sketch and also describe fully how you would construct a crushing-battery with all modern appliances, giving the position of machinery and appliances, with heights and distances from each other; also show by sketch and describe fully how you would construct the foundation for a stamp mill.
4. If an electric generating plant were erected beside a fall of water two miles distant from the crushing-battery, what class of motor would you erect—continuous current, alternating current, multipolar, or polyphase machine? Give your reasons for same.
5. If 120 brake horse-power had to be conveyed from a dynamo to the motor at a battery two miles distant, with a current of 100 amperes, the resistance on the cable being 0.45 ohms per mile, what would be the loss in watts in the total length of the cable?
6. Describe fully the construction and use of a tube mill. Give its dimensions, capacity, with fineness of ore operated on, the speed the mills are driven, and the horse-power required to work them.

SUBJECT B.—*Amalgamating-machines.*

1. (a.) Describe the action of a Wifley concentrator. (b) State the quantity of tailings that it will treat in twenty-four hours; (c) the speed that it has to work at, and the horse-power required to work it.
2. What effect has heat when applied to amalgamating-pans? What chemical substances are used in pan amalgamation? What are their actions, and what advantage, if any, is there by using them?
3. How is amalgamation of gold and silver produced? What advantage has pan amalgamation over tables covered copper plates coated with quicksilver? Describe fully.
4. What is meant by a settler? State the difference between a settler and a combination pan, and describe fully their action.

SUBJECT C.—*The Use of Quicksilver, and Methods of using it in connection with the Extraction of Gold and Silver from Ores.*

1. Describe fully how to remove all impurities from quicksilver.
2. How are copper plates cleaned and prepared to receive a coating of quicksilver; and, when used at a battery, how is the bullion removed?
3. What thickness of copper or Muntz-metal plates would you use for covering amalgamating-tables? Give your reasons for same.
4. After copper plates are coated with quicksilver, what should be done to keep the plates always in good condition when they are being used?
5. What action has antimony, lead, zinc, and tin on quicksilver when used for amalgamation of gold and silver, and how do you know when quicksilver is charged with those metals?
6. How is quicksilver retorted, and what steps are taken to prevent the fumes from the heated quicksilver arising during the retorting operations?
7. What effect has a current of electricity on quicksilver which is charged with antimony, and how is electricity applied?