

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

1. What metallic ores are found in slate, schist, gneiss, serpentine, limestone, and andesite?
2. Give the names and compositions of the ores of lead, copper, tin, antimony, zinc, gold, and silver, and where found in New Zealand.
3. Can you distinguish between the different lodes, and class them accordingly?

SUBJECT R.—*A Knowledge of Arithmetic and Method of keeping Mining Accounts.*

1. If 6 persons earn in 21 weeks £120, how much will 14 persons earn in 46 weeks?
2. What is the square and cube root of 428,661,064?
3. If the assay of ore gave 15 dwt. per ton, and the mill recovered 69 per cent., what is the loss and recovery from 439 tons?
4. Show how you would calculate the number of cubic feet to a ton of quartz in the solid; also the space it would occupy when broken to go through a 3 in. ring.
5. A block of stone between levels and passes measures 30 ft. long and 111 ft. high; at one pass the reef was 11 ft. thick, tapering off to 3 ft. at the other pass: how many cubic yards in the block?
6. A manager gave instructions to have 50 tons drawn from No. 1 level more than No. 2 level to equalise mill returns; the tally drawn from both gave 500 tons: how much was drawn from each level?
7. Show how you would tabulate the method of keeping accounts at a mine, under different headings, brought down with the total expenditure for one month.

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FOURTH DAY.—TIME: 2 P.M. TO 5 P.M.

SUBJECT K.—*The Working of Dredges, and the Working of Appliances required to carry on Gold-dredging Operations.*

1. What provision would you make to disintegrate the ground if the gravel was cemented together to such an extent that it could not be easily scooped up by the buckets?
2. Describe fully how you would work the dredge to keep the buckets always lifting full, and the appliances required to do the same.
3. How is an elevator placed on a dredge? What is its use?

SUBJECT L.—*The Strength of Ropes, Chains, Machinery, and Appliances necessary to carry on Dredging Operations.*

1. If a dredge had a beam of 25 ft. at the water-line and 15 ft. on the bottom, and drawing 4 ft. of water, show by calculation the strain on the front mooring ropes or chains if the dredge were working in the river where the velocity of the water was equal to 10 ft. per second.
2. Describe the different appliances necessary to carry on dredging operations on a river subject to floods, and the provision you would make for the safety of the workmen in the event of an accident occurring to swamp or sink the dredge.

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FIFTH DAY.—TIME: 9 A.M. TO 1 P.M.

SUBJECT O.—*The Diameter, Strength, and Jointing of Hydraulic Pipes required to convey specified Heads of Water.*

1. Required, the diameter of a hydraulic nozzle to discharge eight sluice-heads of water, the head of water on the nozzle being 160 ft. Show by calculation.
2. Show by calculation the thickness of a wrought-iron riveted pipe 18 in. in diameter to stand a pressure of 200 ft. head of water; allowing 3 per cent. as a factor of safety.

SUBJECT P.—*The Construction of Water- and Tail-races.*

1. Show by calculation the number of sluice-heads of water a ditch cut in ordinary gravel ground, with a fall of 12 ft. to the mile, will convey, the width in the bottom being 3 ft., the sides having a slope of 6 in. to 1 ft., and the depth of water in the ditch being 2 ft.
2. What is the least gradient you could give a tail-race, to work effectively—(a) If you were working a gravel face; (b) if you were washing sea-beach sand?

SUBJECT Q.—*The Working of Auriferous Gravels by Hydraulic Sluicing, either by elevating or otherwise, including Sluices and Gold-saving Appliances.*

1. Show by sketch a hydraulic-elevating plant, and describe fully its construction.