

6. Express the difference between $\frac{6}{35}$ of a pound avoirdupois and $\frac{7}{8}$ of a pound troy as the fraction of a pennyweight.
7. Multiply $13\cdot254$ by $6\cdot35$.
8. Calculate the number of hectares that are equivalent to 100 acres, having given that 1 mile = $1609\frac{1}{3}$ mètres, 1 hectare = a square hectomètre, and 1 hectomètre = 100 mètres.
9. Find to four decimal places the square root of $\frac{\sqrt{3}-1}{\sqrt{2}+1}$.
10. The density of oxygen gas being $1\cdot105$, and that of hydrogen being $\cdot069$, find the proportion by volume, and also by weight, of oxygen and hydrogen in a mixture of these two gases the density of which is $\cdot365$.
11. At what rate per cent., simple interest, will £490 amount to £653 6s. 8d. in $5\frac{1}{2}$ years?
12. A sold some shares to B at a profit of 10 per cent.; B sold them to C at a profit of 10 per cent.; and C sold them back to A at a profit of 10 per cent. If A's loss on these transactions amounted to £144 7s. 6d., find the sum that he originally paid for the shares.
13. Two sums of money, amounting to £3,500, were invested, the larger sum at 8 and the smaller at 9 per cent. If the whole yearly interest amounted to £291 5s., what were the two sums?

Algebra.—For Senior Civil Service. Time allowed: 3 hours.

1. Define the terms—coefficient, exponent, power, factor, multiple, common measure, binomial, rational quantity, cube root.
2. Find the value of $\frac{a^3+3ab}{ab-b^2} \div \frac{a^2+ab+b^2}{a-b}$, when $a=-2$, $b=\frac{1}{2}$; also of $\sqrt{2x}-3\sqrt{1-x}+\sqrt{3-x}$, when $x=\frac{1}{3}$.
3. Expand $(a^2+b^2)^2 \cdot (a^2-b^2)^4$; and divide a^4+4b^4 by $a^3-2ab+2b^3$.
4. Simplify—
 (a.) $\frac{x^3}{x^3-1} + \frac{x^2+x}{x^2+x+1} - \frac{2x}{x-1}$;
 (b.) $\left(y + \frac{x-y}{1+xy}\right) \div \left(1-y \cdot \frac{x-y}{1+xy}\right)$.
5. Find the value of $\left\{\sqrt{1-x} + \frac{1}{\sqrt{1+x}}\right\} \div \left\{1 + \frac{1}{\sqrt{1-x^2}}\right\}$, when $x = \frac{a}{a-b}$.
6. Extract the square root of $a-b$ to five terms.
7. Solve the equations—
 (a.) $\frac{x-3}{x+2} - \frac{1}{2} = \frac{x-3}{2x-1}$;
 (b.) $\frac{x}{a} + \frac{y}{b} = 1$, and $\frac{y}{a} - \frac{x}{b} = 1$;
 (c.) $\frac{8}{x+2} - \frac{2}{4-x} = \frac{3}{5-x}$.
8. The value of n pounds and 12 shillings is twice the value of 12 pounds and n shillings: find n .
9. A dealer, having bought a number of sheep, remarked that if he had paid a shilling a head less he should have got 20 sheep more for the same money, but if he had paid a shilling a head more he should have got 15 sheep less: find the number of sheep bought, and the price paid per head.

Geography.—For Class D. Time allowed: 3 hours.

[N.B.—Candidates need not answer more than ten questions.]

1. A school-map of the world in hemispheres is described as a “stereographical projection on the plane of the 20th meridian.” Explain what is meant, and point out the merits and defects of such a projection.
2. Where are the rainless regions of the earth? Account for the phenomenon in each particular case.
3. Name the countries, cities, districts, and important islands on or in the immediate neighbourhood of (a) the Tropic of Cancer, (b) the Tropic of Capricorn, (c) the Equator; and state approximately the latitude of Cape Horn, Cape of Good Hope, the Bluff, the Land's End.
4. What foreign countries do Westland, Auckland, Otago resemble? and in what respects?
5. Apart from the fact that New Zealand is a British colony, what claim has it, as a whole, to be called the “Britain of the South”? What Asiatic group of islands does it most resemble, and in what ways?
6. With what great physical drawbacks has Australia to contend? Compare and contrast it with Africa.
7. State, in orderly, tabulated form, the names, situation, and interesting associations of ten places of *historical* note on the shores of the Mediterranean.
8. Note briefly the particulars on which you would rely to interest New Zealand pupils in six of the following towns: Bombay, Montreal, Florence, Cairo, New Orleans, Winnipeg, Sydney, Edinburgh, Rio Janeiro, Rouen.
9. What advantages does the Canadian Pacific route offer to travellers in comparison with the Central Pacific line? Describe the successive aspects of the territory through which it passes.
10. Which of the United States present the greatest natural attractions in the form of romantic scenery? and what are the special attractions they respectively offer?