11. Explain the difference between simple and compound proportion. In Nova Scotia the sovereign is worth $5, and in Ontario $4.86\frac{2}{3}$; convert $2,720.40 Ontario currency into Nova Scotia currency.
12. (*a*) Received $4,100 from my agent, who had deducted his commission at 5 per cent., as proceeds of sale of goods; what were the goods sold at?
(*b*) Remitted $4,100, including commission, to my agent to invest for me, on commission of 5 per cent.; what was his commission?

BOOK-KEEPING—Second Class.

1. Describe the Cash Book, Journal, Ledger, and Invoice Book.
2. You commence business with $5,000 cash, and $5,000 goods purchased from A. B. at 6 months. Show what accounts you would open.
3. What accounts would be affected, and how, by the following entries:—
(1) Sold goods to A. on account, $500.
(2) Sold goods to B. to the amount of $1,000, receiving $600 cash and his note at 4 months, payable at Bank of Toronto.
(3) Bought goods from C., $1,600, paying $900 cash and giving my note at 4 months, payable at Bank of Commerce.
(4) Had B.'s note discounted at Bank of Toronto at 8 per cent.
(5) Received a legacy of $800.
4. What is the object of the Profit and Loss account? When do you debit and when credit it?
5. Describe the steps you would take in closing a set of books.

ALGEBRA—Second Class.

1. Simplify the complex fraction $\frac{\frac{1}{1+a}-\frac{1}{1-a}}{\frac{1}{1+a}+\frac{1}{1-a}}$ (*Text book.*)
2. Resolve $a^{18}-x^{18}$ into its elementary factors. (*Text book.*)
3. Divide by Horner's synthetic method $6a^4-a^3+2a^2+13a+4$ by $2a^2-3a+4$. (*Text book.*)
4. (*a*) Prove that the L. C. M. of two algebraical expressions is their product divided by their G. C. M. Does this rule hold good for more than two expressions? Illustrate.
(*b*) Find the L. C. M. of $a^3-9a^2+26a-24$, and $a^3-8a^2+19a-12$. (*Text book.*)
5. Prove that x^m-1 is divisible by $x-1$ without remainder, m being a whole number.
6. Solve the following equations:—
(*a*) $5m-\frac{2x}{3}-\frac{5(1-2m)(x-1)}{2}-\frac{20mx+1}{4}=0.$
(*b*) $\frac{5}{x}+\frac{12}{y}-97=0$, and, $\frac{1}{5x}-\frac{1}{12y}=\frac{1}{2}$.
(*c*) $x-y=a$, $x^2-y^2=b$. (*Text book.*)
7. "A certain number of two digits is such that when divided by 4 less than twice the sum of its digits, the quotient is three; but when divided by 5 more than the difference of the digits, the quotient is 13. Required the number, the right hand digit being the greater." (*Text book.*)
8. Two men A and B, dig a trench in $3\frac{3}{7}$ days. If A were to do more work by one third than he does, and B more work by one half than he does, they would dig the trench in $2\frac{26}{59}$ days. In what time would each dig it alone, at his present rate of work?
9. Prove that when the unequal quantities n and m have the same sign, $\frac{m}{n}+\frac{n}{m}>2$.
10. Prove that in the arithmetical extraction of the square root of a number which is a complete square, after $n+1$ figures of the root have been obtained by the rule, n may be obtained by dividing the last remainder by the last trial divisor. (*Text book.*)

Note.—It is recommended to the local examiners that the percentage of marks, necessary by the regulations of the Council of Public Instruction in order that a candidate may be ranked of a certain grade, be taken on the whole value of the paper diminished by the number of marks allowed to question (10).

EUCLID—Second Class.

1. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the two sides of the one greater than the angle contained by the two sides equal to them, of the other, the base of that which has the greater angle shall be greater than the base of the other.
2. To describe a parallelogram equal to a given rectilineal figure and having an angle equal to a given rectilineal angle.
3. If a straight line be divided into any two parts, the squares on the whole line, and on one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square on the other part.
4. To describe a square that shall be equal to a given rectilineal figure.
5. If a straight line touch a circle, and from the point of contact a straight line be drawn cutting the circle, the angles which this line makes with the line touching the circle shall be equal to the angles which are in the alternate segments of the circle.

Deductions.

6. If from any point D in $A\ C$, the base of a triangle A B C, which has the two sides $B\ A$ and $B\ C$ equal to one another, $D\ E$ be let fall perpendicular on $B\ C$, the angle $A\ B\ C$ shall be double of the angle E D C.
7. Straight lines which respectively bisect two opposite angles of a parallelogram are either parallel or coincident.
8. If from B, the vertex of a triangle $A\ B\ C$, which has the two sides $A\ B$ and $B\ C$ equal to one another, the straight line $B\ D$ be drawn to a point D in the base $A\ C$, $A\ B^2=B\ D^2+A\ D,\ D\ C$.
9. Draw a straight line to touch each of two given circles.

Note.—It is recommended to the local examiners, that, in the above paper, the book work and two of the deductions be regarded as a full paper counting 100; and that the percentage of marks necessary by the regulations of the Council of Public Instruction in order that a candidate be ranked of a certain grade, be taken on the value of the paper thus reduced.

NATURAL PHILOSOPHY.—Second Class.

1. In a straight lever CBA, a weight W of 10 lbs. acts at B, a distance of 5 feet from the fulcrum A; and the power P is applied at C, on the same side of the fulcrum as W, but in an upward direction. If AC be $12\frac{1}{2}$ feet, what is P? And what is the pressure on the fulcrum?
2. Assuming the principle of virtual velocities, deduce therefrom the relation that must subsist between the Power and the Weight in the lever, in order that there may be equilibrium?
*3. At points A, B, C, which are in the same straight line, weights of 8 lbs., 12 lbs., and 20 lbs. respectively, are placed. If AB be $12\frac{1}{2}$ feet, and BC be 5 feet, it is required to find the centre of gravity of the three weights.
4. (*a*) In a system of pullies, where each pully hangs by a separate string, what power will sustain a weight of 104 lbs., there being two movable pullies in the system?
(*b*) If the weight of each of the two pullies be $1\frac{1}{3}$ lbs., by what power will the weight of 104 lbs. be sustained, the weight of the pullies being taken into account?
5. A weight of 80 lbs. is sustained on an inclined plane by a power of 60 lbs., acting parallel to the base. How many feet does the plane rise in the hundred?
6. What pressure will be exerted by a power of 20 lbs., acting on a differential screw, in which the power lever is 50 inches long, the pitch of the exterior screw $\frac{2}{11}$ of an inch, and that of the inner screw $\frac{1}{5}$ of an inch. (Text-book.)
7. What is the amount of pressure exerted against a mill dam, the part submerged being 10 feet wide and 80 feet long, and the depth of the water being 8 feet? (Text-book.)
8. (*a*) What is meant *uniformly accelerating force?* For instance, g being the force of gravity at the earth's surface, explain the formula, $g=32$.
(*b*) A body is falling to the earth at the earth's surface; what velocity has it acquired after descending for 6 seconds? And through what space does it fall in the succeeding second?
* (*c*) At the surface of a planet, whose mass is such that the force with which bodies at its surface gravitate towards it is only one-fourth of the force of gravity at the earth's surface, a projectile is shot upwards with an initial velocity of 80 feet in the second. How high will it rise?
9. (*a*) Enunciate Boyle's law, determining the relation between the density of a gas and its elasticity.
(*b*) Describe the air-pump.
(*c*) Describe the barometer.
* (*d*) A cylinder whose height is $1\frac{1}{4}$ feet, and the radius of its base 2 feet, contains as much air, as, under the ordinary