

cents on every dollar that the goods cost, and also express charges amounting to \$1.45. This whole cost was $77\frac{1}{2}$ cents more than the marked price of the books. What was the marked price, also the amount of duty collected? *Ans.* \$30 and \$5.82 $\frac{1}{2}$.

VIII. There are six numbers whose G.C.M. is 18, and whose L.C.M. is 1260, find them.

Ans. 36, 90, 126, 180, 252, 630.

IX. An article is sold at a price which is $\frac{1}{4}$ above cost. Had the cost been $\frac{2}{3}$ of what it really was, and the selling price remained the same, the gain would have been \$3; find the first cost. *Ans.* \$4.50.

X. The length of a picture is to its breadth as 5 : 4, and it costs \$4.10 to get it framed with a moulding every 3 inches of which is worth 10 cents. If the workman charge 50 cents for making and fitting the frame, find what it will cost to varnish the picture at \$1.25 per square yard. *Ans.* 69 $\frac{1}{2}$ cts.

XI. How much should a man, who wishes to make 10 per cent. on his money, pay for a note drawn for \$160 with interest at 7 per cent. per annum, the note having already run 4 months, and becoming due in 5 months from the time of purchase?

Ans. \$161.664.

XII. A house is 40 feet long, 25 feet wide, the walls are 12 feet high, and the ridge of the roof rises 10 feet above the walls. The roof extends beyond the walls one foot all around. In the walls there are 2 doors each 7 ft. by 5 ft., and 6 windows each 5 ft. by 3 ft. How much money will be required to buy material to "close in" this house and lay down the lower floor, under the following conditions:—The roof to be covered with shingles each 18 inches long, 4 inches wide, and 5 inches exposed; the walls to be covered with siding 6 inches wide, each piece overlapping the one beneath it one inch; and the floor to be laid down of boards $1\frac{1}{2}$ inches thick; the shingles to cost \$1.75 per bunch of 500, the siding to cost \$12.50 per thousand feet, surface measure, and the flooring to cost \$16 per thousand feet of one inch thick? *Ans.* \$61.68.

UNIVERSITY OF TORONTO.

Senior Matriculation, 1881.

ARITHMETIC AND ALGEBRA.

1. Given £1 sterling = \$4.86 $\frac{2}{3}$, obtain short methods for the conversion of sterling into currency and currency into sterling, and illustrate by examples.

2. The issue price of certain railway shares was \$50, to be paid in five instalments of \$10 each, the first on application. After a "call" or second payment of \$10 the shares stood at \$1 a share premium. A person then invested \$756, and after paying a further call of \$10, a dividend was declared of $8\frac{1}{2}$ per cent. per annum on the paid-up capital. What is the amount of his dividend, and what interest does he get for his money?

3. Explain the metric system of weights and measures, and give the English equivalent of each metric unit.

4. Simplify

$$\frac{bc(x-a)^2}{(a-b)(a-c)} + \frac{ca(x-b)^2}{(b-c)(b-a)} + \frac{ab(x-c)^2}{(c-a)(c-b)}.$$

$$5. \text{ If } \frac{y+z}{3b-c} = \frac{z+x}{3c-a} = \frac{x+y}{3a-b}$$

$$\text{shew that } \frac{x+y+z}{ax+by+cz} = \frac{a+b+c}{a^2+b^2+c^2}.$$

$$6. \text{ If } p+q+r=0, \quad p^4+q^4+r^4 \\ = \frac{1}{2}(p^2+q^2+r^2)^2.$$

7. Divide by Horner's method

$$x^4 + 5x^2 - 189x^3 - 162x^2 + 486x - 2187 \\ \text{by } x^4 + 3x^3 + 27.$$

8. Three boats started at the same moment, at intervals of 100 yards apart; in 6 minutes the third overtook the second, and in 2 minutes more it overtook the first. How soon will the second overtake the first?

9. Solve

$$\begin{cases} y\sqrt{(a-x)(x-b)} + x\sqrt{(a-y)(b-y)} \\ = 2b\sqrt{(a-x)(a-y)} + 2a\sqrt{(x-b)(b-y)} \\ xy = 4ab. \end{cases}$$

10. When are four quantities said to be in proportion? What value must be given to x to make $1+x$, $2+x$, $8-x$, $10-x$ proportionals?