JULY EXAMINATIONS, 1880.

FIRST CLASS TEACHERS—GRADE C.

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1. Prove the rule for multiplying one fraction by another, and deduce that for dividing one fraction by another.

Prove

$$\frac{\lfloor\underline{48}}{\lfloor\underline{13}\times\lfloor\underline{35}}+3.\frac{\lfloor\underline{48}}{\lfloor\underline{12}\times\lfloor\underline{36}}+3.\frac{\lfloor\underline{48}}{\lfloor\underline{11}\times\lfloor\underline{37}}+\frac{\lfloor\underline{48}}{\lfloor\underline{10}\times\lfloor\underline{38}}=\frac{\lfloor\underline{51}}{\lfloor\underline{13}\times\lfloor\underline{38}}$$

2. Shew, without algebra, the reasons of the rules for pointing in multiplication and division of decimals.

Reduce to a decimal of four places:

$$\frac{1}{2^3}+\frac{2}{2^3}+\frac{3}{2^4}+\frac{4}{2^5}+\frac{5}{2^6}+\frac{6}{2^7}+\frac{7}{2^8}+\frac{8}{2^9}.$$

3. A rectangular piece of ground contains 9 acres 1 rood $16\frac{1}{3}$ poles; its length to its breadth as 3 to 1: find (1) the distance round it, (2) the distance from one corner to the opposite corner.

4. Investigate a rule for finding the amount of an annuity at compound interest for a term of years.

I borrowed \$2000 for four years at 10 per cent. compound interest, to be paid in four equal annual payments. Find the annual payment.

5. A piece of glass whose specific gravity is 2·4, and whose weight is $4\frac{1}{2}$ lbs., is found to weigh only $2\frac{1}{4}$ lbs. when weighed in a certain liquid. Find the s.g. of the liquid.

6. Shew how to find the true discount for a given time and rate.

I bought a bill of goods amounting to \$1040, for which I gave my note payable in six months without interest, and immediately sold the goods for \$1200 on such terms of credit as made my gain $17\frac{1}{2}$ per cent., reckoning money worth 8 per cent. Find the term of credit,

7. Prove that the area of a circle $= \pi r^2$, or = radius $\times$ $\frac{1}{2}$ circumference.

What is the proportionate error in the following rough rule for finding the area of a circle:—Take $\frac{1}{7}$ of the square on the diameter and add one per cent.

8. A cistern is kept constantly supplied with water; supposing it full, it is found that 24 equal taps opened together will empty it in $5\frac{1}{2}$ minutes, and 15 of them will empty it in 13 minutes. How many of them will empty it in 33 minutes?

9. State the rule for finding the characteristic of the logarithm for any number.

Find the number of digits in the integral part of $3^{30}\times5^{15}\div2^{11}$, and the number of ciphers between the decimal point and the first significant figure of the decimal representing 3^{-15}.

10. (1) The base of a triangle is b, and its altitude a, required the distance from the vortex at which a parallel to the base must cut the altitude in order to bisect the triangle.

(2) The perimeter of a right angled triangle is p, and the radius of the inscribed circle is r: determine the sides of the triangle.