## JULY EXAMINATIONS, 1881.

### FIRST CLASS TEACHERS—GRADE C.

1. Examine the merits of the following test of the accuracy of a sum in addition:—"Divide the sum of the digits in each horizontal line by 9, retaining only the remainders; divide the sum of these remainders by 9, and if the remainder then obtained be equal to the remainder obtained on dividing the sum of the digits in the answer by 9, the answer is correct."

Will the test apply if "vertical lines" replace "horizontal lines" in the preceding; and if so, why?

2. A man sells goods for $1125. Half he sold at an advance of 25 per cent. on the cost, two-fifths at an advance of 12½ per cent., and the remainder at half its cost. What did he originally pay for the goods? $1000

3. If 4 pumps, each having a length of stroke of 3 ft. and piston of radius 3 inches, empty a cubical cistern whose side is 6 ft., in 1 hour; what must be the radius of the pistor of each of 6 pumps whose stroke is 4 ft., that they may empty a cistern whose sides are half those of the former in ⅝ of an hour, there being a defect in the latter pumps which takes away 10 per cent. of their efficiency? 1 inch

4. A tax bill for $291.60 may be paid in three instalments—$111.60 on June 25th; $90 on August 4th; and $90 on October 4th. If all be paid on June 25th a reduction is allowed of $\frac{2}{100}$ of the instalments that might have been deferred. What rate per cent. per annum is this allowing for money? 11 $\frac{292}{365}$ %

5. A bankrupt's apparent assets are 80 per cent. of his liabilities; but on $20,000 of these assets he recovers only 80 cents on the dollar, and 4 per cent. of the amount the estate actually realizes is consumed in the process of winding it up. He pays 60c. on the dollar; what were his liabilities? $22857 1/7

6. *A* gives *B* $210 on May 11th, and in return takes his note at 5 months, agreeing not to exact interest. On June 11th, *A* sells the note to *C* for $205, and *B* makes good to *A* the $5 so lost. When the note falls due, *C* exacts interest at 7 per cent. per annum. Find the rate per cent. per annum gained, lost or paid by the several parties to this transaction.

7. A municipality whose property is assessed at $1,000,000 borrows $40,000; find an expression for the tax (rate in the dollar) that must be levied to form a sinking fund that will repay this in 10 years, money being worth 6 per cent. per annum, the taxes being levied yearly and money compounded half yearly.

8. The sides of a triangle are 4, 5, 6; find its area.

9. Eight equal spherical iron balls, radius 1 foot, are just enclosed in a cubical box, and the box is then filled up with water. Compare the weights of iron and water in the box, the specific gravity of iron being 7.79.

Give the expression for the surface of a sphere in terms of its radius.