772 lbs. raised I ft. = heat of I lb. thro' I^o F. $\frac{1}{2} \times 772$ '' '' '' I gram I^o C. $\frac{1}{2} \frac{1}{2} \frac{1}{2$

6. A specimen of galena yields S2 per cent. of its weight in lead, and a cube of the lead one-fifth of an inch upon its edge yields a sphere of silver .027 inches in diameter. If the density of the lead be 11.3 and of silver 10.5, and if silver be worth S4 cents per ounce, what value of silver is contained in one ton of galena?

Per question, lead yields .0012 of its bulk in silver, so that, taking density into account, 1 ton galena is worth

 $\binom{n^{n}}{100} \times 2000 \times \frac{1}{1000} \times \frac{1}{100} \times \frac{1}$

7. A flume is 2 feet wide at the bottom, 3 feet at the top, and 4 feet deep, and it is filled to a height of $2\frac{1}{2}$ feet with water. It supplies a turbine from which the water issues through 12 circular orifices each 1 inch in diameter with a velocity of 12 feet per second. Find the mean velocity per second with which the water moves along the flume.

It is easily found by similar triangles that width of flume at surface of water is $2\frac{a}{3}$ feet. The area of the quadrilateral formed by the sides of flume, its bottom, and surface of water, is $\frac{1}{2}(2+2\frac{a}{3}) \times \frac{a}{2} = \frac{1}{3}\frac{a}{3}^{a}$ sq. ft. Escape $= 12^{2} \times \pi(\frac{1}{3})^{2}$ or $\frac{1}{3}\frac{1}{4}$ cub. ft. per second. Water will therefore flow along the flume at rate of one foot in $\frac{1}{3}\frac{a}{3} \div \frac{1}{3}\frac{1}{4}$ or $7\frac{a}{1}\frac{a}{7}\frac{a}{6}$ seconds.

8. A piece of lead in the form of a prismoid is 3 inches by 4 upon one base and 5 inches by 6 upon the other, and 10 inches high. If it is pressed into the form of a sphere what will be its radius?

Adding together the areas of the two faces and four times the area of a section parallel to the two ends and midway between them, multiplying the sum by the height and taking one-sixth the product, we have volume of prismoid=2031 cub. ft., each side of middle section being half the sum of the corresponding sides of the ends. For r the radius of sphere, $\frac{4}{3}\pi r^2 = \frac{6}{4}^0$ $(\pi = \frac{2}{7}^2)$; $\therefore r = 3.64$ in.

MODERN LANGUAGES.

JOHN SEATH, B.A., ST. CATHARINES, EDITOR.

NOTE.—The Editor of this Department will feel obliged if teachers and others send him a statement of such difficulties in English, History, or Moderns, as they may wish to see discussed. He will also be glad to receive Examination Papers in the work of the current year.

ENGLISH.

UNIVERSITY OF TORONTO.

ANNUAL EXAMINATIONS, 1982.

Junior Matriculation.

ENGLISH.—ARTS, FOR PASS; MEDICINE, FOR PASS AND HONORS.

Examiner-Edward B. Brown, B.A.

Questions 12, 13, and 14 are for Candidates for Honors in Medicine only. Questions 8, 9, 10 and 11 are for Candidates in Arts only.

1. Write a short essay on any one of the following subjects :

(a) The School System of Ontario.

(b) Æstheticism.

(c) Lord Macaulay.

(d) Post equitem sedet atra cura.

2. Point out all grammatical errors and faults of style in the following sentences :

(a) The Dean quit active work about a year ago.

 (δ) Mr.——'s medical attendant telegraphed that his patient had been removed and was quite smart.

(c) The author probably don't mean to say that the facts are clearly proven.

(d) A most enjoyable time was spent by those present.

(c) When he was young he travelled some, and thus gained considerable experience.

(f) When you were out, sir, a party called who said his name was Johnson.

(g) I do not know as I can go with you to-morrow, but I should like to.

3. "His furniture consisted of a bed, a chair, a bureau, a trunk, and numerous pegs with coats and *pants* and *vests*,—as he was in the habit of calling waistcoats and panta-