Mathematical Department.

VICTORIA UNIVERSITY MATRICULATION.

SEPTEMBER, 1881.

ARITHMETIC.

Examiner-J. A. MCLELLAN, LL.D.

1. Prove the rules for pointing in multiplication and division of decimals.

Simplify $\frac{2}{5}(3\frac{1}{5}+1\frac{1}{4})$ L. $+\frac{1\frac{1}{5}-\frac{1}{5} \text{ of } 1\frac{4}{5}}{\frac{1}{20} \text{ of } 3\frac{1}{5}+\frac{1}{4}} \times 475 \text{ of } \frac{5}{5}+\frac{4\cdot 2}{\cdot 012} d$. 2. The value of the paper required for papering a room supporting it to be 27 in. wide and 9 cents a yard, is \$10.35; what would the cost be if the paper, were 2 ft. wide and 8 cents per yard?

3. Define the terms measure, multiple, comnon measure, least common multiple.

The L.C.M. of two numbers is 634938944494; their G.C.M. is

9187 : one of the numbers is 85044059, find the other. 4. Define ratio and proportion. Prove that the product of the extremes is equal to the product of the means.

A grocer has 630 lbs. of a mixture of chicory and coffee, the coffee being to the chicory 4:3; what amount of coffee must be added to the mixture to make the ratio 10:7?

5. A person discounts a note due in 15 months, so as to make 10 per cent. on his money ; what per cent. on the face of the note does he exact?

6. If 4 men earn as much in a day as 7 women, and 1 woman earns as much as 2 boys; and if 6 men, 10 women, and 14 boys earn \$110 in 8 days, what will be the earnings of 8 men and 6 women working together for 10 days?

7. If a person has a certain capital, 40 per cent. of which he invests in 32 per cent. stock @ 90, the remainder in 4 per cent. stock @ 95; his total income is \$1340. Find the amount of his capital.

8. Find the weight of a spherical iron shell whose internal diameter is 5 in., the thickness of the metal being 1 inch.

9. Find the area of a trapczoid, whose parallel sides are 27.5 yds. and 38.5 yds. respectively.

10. A man bought property for \$9000, and agreed to pay principal and interest (compound) in four equal annual payments. Find the annual payment, interest being calculated @ 6 per cent.?

EXAMINATION QUESTIONS

SUITABLE FOR

INTERMEDIATE EXAMINATIONS.

ALGEBRA.

- 1. (a) Prove that $-b \times -d = +bd$; divide (b) $a^{4}(2x-y)^{2} a^{2}x^{3}(x + y)^{2} + (x+y)2ax^{4} x^{6}by a^{3}(2x-y) ax$ (b) $a^{*}(2x-y)-a^{*}(x+y)+(a+y)-a^{*}(x+y)+a^{*}(x+y$
- (c) What is the value $x^{-}+x^{-}$ when $x^{-}+x^{-}-5$. 3. (a) $\frac{1}{1+x^{m-n}+x^{m-p}}+\frac{1}{1+x^{n-m}+x^{n-p}}+\frac{1}{1+x^{p-m}+x^{p-n}}$. (b) $(x^{n}-1)\div(x^{n}-1)$. Give the first three terms and the last three terms of the quotient. (c) $a \times 0 = 0$ and $b \times 0 = 0$ $\therefore a = b$. Discuss this statement. 4. (a) If $a^{2} + b^{2} = 0$, show that a = 0 and b = 0. (b) $(b-x)(c-a)\pm(a-a)(a-b)\pm(a-b)(b-c)$ is always negative

 - (b) (b-c)(c-a)+(c-a)(a-b)+(a-b)(b-c) is always negative when a, b and c are real and not all equal. Prove
 - (c) $x^5 + y^5 x^4y xy^4$ is positive when x and y are positive and unequal

5. (a) Solve
$$\sqrt[4]{1-2x+\sqrt[4]{1+2x}} = 3$$

(b)
$$\left(\frac{x}{x-1}\right)^2 + \left(\frac{x}{x+1}\right)^2 = n(n-1)$$

(c)
$$\sqrt[4]{a^2 + cx + \sqrt[4]{a^2 - cx = \sqrt[4]{2acx}}}$$

6. (a) Factor $(b+c=a-x)^4(b-c)(a-x)$
 $+(c+a-b-x)^4(c-a)(b-x)$
 $+(a+b-c-x)^4(a-b)(c-x)$

(b) If
$$\frac{a-b}{b-c} = \frac{a}{c}$$
 show that $a^{2} + c^{2} > 2b^{2}$.
(c) Factor $1 - \left\{ \frac{a^{2} + b^{5} - c^{2} - d^{2}}{2ab + 2cd} \right\}^{2}$.
7. (a) Find the G. C.M. of
 $(ax+by)^{2} - (a-b)(x+z)(ax-by) + (a-b)^{2}xz$,
and $(ax-by)^{2} - (a+b)(x+z)(ax-by) + (a+b)^{2}xz$.
(b) If $\frac{a}{b} = \frac{c}{d}$ show that
 $\frac{1}{ma} + \frac{1}{nb} + \frac{1}{pc} + \frac{1}{qd} = \frac{1}{bc} \left\{ \frac{a}{q} + \frac{b}{p} + \frac{c}{n} + \frac{d}{m} \right\}$
(c) If $a^{2} + bc)^{2}(b^{2} + ac)^{2}(c^{2} + ab)^{2} = a^{2} - bc)^{2}(b^{2} - ac)^{2}(c^{2} - ab)^{2}$ then

either $a^3+b^3+c^3+abc=0$, or $\frac{1}{a^3}+\frac{1}{b^3}+\frac{1}{c^2}+\frac{1}{abc}=0$. 8. A rectangular garden, sides = p and q, has a path along the inside of its perimeter, width = r. Express the area of the path in terms of p, q, and r. 9. I went 56 miles on a railway, and the remainder of my journey

on a stage. The train ran $\frac{1}{2}$ of the whole journey in the same time the coach travelled 5 miles. When I arrived at home the train was 35 miles beyond the station at which the stage left me. Compare the rates of the stage and the coach.

10. A sum of money, \$P, is loft to A, B, and C, so that as each comes of age at the end of a, b, and c years, he may have the same amount. Find their shares if the money be divided now.

Contributions.

PHYSICAL EXERCISE.

BY ALFRED CARPENTER, M.D. (LOND.), C.S.S. (CAMP.), VICE-PRESIDENT OF THE BRITISH MEDICAL ASSOCIATION.

The narrow view of the function of the school-master is well exemplified in some schools by the entire banishment of physical exercise from the rota of school work. We send our children to school for the purpose of training them for the battle of life, which they will have to encounter when they reach to man's estate. It is by the equal and continuous development of each and every part of the body that this battle will be fought with success, and if one part developes at the expense of another, or by its more rapid development puts a bar to the progress of the others, the subject of it is at disadvantage in his future struggles. Many a Cambridge wrangler and Oxford first-class man has found this out in after life. He is able to solve a problem in differential calculus, to make Latin verses, or to read a passage in any of the dead languages at sight, but he has not cultivated the talent of common sense, or educated his muscles so that they can enable him to leap over some slight impediment in his path. He finds himself outstripped in the daily race by men whom he has been taught to despise, and who, in return, have a very small opinion of him and his mental power. The nerve force of thought in his brain has been developed at the expense of his motor power, and as the room for growth is limited, the later is dwarfed and imperfect. Life is 'organization in action,' and the various functional activities of the body must be carried out with normal energy and in a harmonious manner, if they are to be correct in their responses to any and every call that may be made upon them. Physical exercise is indispensable, and it is quite impossible for the functions of respiration and circulation to be carried on in a proper manner if the nuscular system is not developed, and if the material which is necessary for the formation of the muscle is not used up in its proper order. If the muscles are not used equally with the brain tissue, some used up matter is kept back, and will sooner or later act as an impediment to proper brain work, by getting in the way of the latter when it requires all the room which ought to be at its command. The assimilative and disarranging processes of the body are greatly influenced by the activity or inactivity of the muscular system. Hence it follows that no school is properly constituted which does not provide an exercise ground for its pupils, and make the cultivation of muscular force a part of its daily routine. This is not the place to deal with the gen-eral effects of exercise, but it will not be out of order to call to mind the fact that, the natural heat of the body being 98.4; it follows that something must be produced in the blood which is the