and AD in Q, BE and CF in P. Triangle $ABD : AED :: BR : RE$, but ABD is $\frac{2}{3}$ ABC and AED is $\frac{1}{3}$ $ADC = \frac{1}{6}$ ABC. $\therefore$ $BR = 6$ RE. Similarly $AQ = 6$ QD, and $CP = 6$ FP. Again, $ABR = \frac{1}{7}$ $ABE = \frac{2}{7}$ ABC, and $BRD = ABD - ABR = \frac{2}{3}$ $ABC - \frac{2}{7}$ $ABC = \frac{8}{21}$ ABC, $\therefore$ $AR : RD :: 3 : 4$. Hence, if $AR = 3$, $RQ = 3$, and $QD = 1$. $\therefore$ $PRQ = ARP$, $= \frac{1}{7}$ ABE, $= \frac{1}{14}$ ABC.

UNIVERSITY OF TORONTO.

ANNUAL EXAMINATIONS: 1885.

Junior Matriculation.

MATHEMATICS.—PASS.

Examiners { A. K. Blackadar, M.A. / J. W. Reid, B.A.

1. If two angles of a triangle be equal, the sides opposite them shall also be equal.

Draw a straight line so as to divide a given right angled triangle into two isosceles triangles.

2. If a straight line be divided into two equal, and also into two unequal parts, the rectangle contained by the unequal parts, together with the square of the line between the points of section, is equal to the square of half the line.

3. Angles in the same segment of a circle are equal.

Also, state and prove the converse of this proposition.

4. Find the radius of a sphere whose volume is equal to the sum of the volumes of three spheres whose radii are 7, 8 and 9 feet respectively.

5. I borrow $6,000, agreeing to pay principle and interest in four equal annual instalments. Find the annual payment, interest being calculated at 5 per cent.

6. The present income of a railway company would justify a dividend of 6 per cent., if there were no preference shares; but as £400,000 of the stock consists of such shares which are guaranteed 7½ per cent. per annum, the ordinary shareholders receive only 5 per cent. Find the amount of ordinary stock and the company's income.

7. Prove $\frac{y-z}{1+yz} + \frac{z-x}{1+zx} + \frac{x-y}{1+xy} = \frac{(y-z)(z-x)(x-y)}{(1+yz)(1+zx)(1+xy)}$.

Show that if $a+b+c$ is zero, the expression $\frac{a^3}{2a^2+bc} + \frac{b^3}{2b^2+ca} + \frac{c^3}{2c^2+ab}$ is also zero

8. Prove the rules for finding the G.C.M. and L. C. M. of two algebraic quantities.

Find the G. C. M. of
$x^3 - (2a+b)x^2 + a(2a+b)x - a^2(a+b)$, and
$x^3 - (2b+a)x^2 + b(2b+a)x - b^2(b+a)$,
and the L C. M. of
$a^3 + b^3 + c^3 - 3abc$ and $(a-b)^2 + (2a+c)(2b+c)$.

9. Solve the equation $ax^2 + bx + c = 0$, and state and prove the relations between the roots and the co-efficients of the equation.

If α and β be roots of the above equation, find the values of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ and of $\alpha^2 + \beta^2$.

10. Solve the equations:

(1) $3x(x-101) + x + 495 = 0$.

(2) $x + 2 = \frac{x^2+8}{x^2+5}$.

(3) $\begin{cases} x+y+z = a+b+c \\ bx+cy+az = cx+ay+bz = bc+ca+ab. \end{cases}$

MODERN LANGUAGES.

Editors: { H. I. Strang, B.A., Goderich. / W. H. Fraser, B.A., Toronto.

EXERCISES IN ENGLISH.

1. Select, classify and give the relation of the phrases in the following:—

(*a*) Calling his officers together he laid before them his plan of attack.

(*b*) To punish them he kept them in at noon to finish it.

(*c*) In the evening they returned to the camp, laden with plunder.

(*d*) On these conditions the agent of the company offered to accompany him.

(*e*) After a short rest they resumed their journey in the hope of reaching the camp before night.

2. Contract the following into simple sentences:—

(*a*) He left orders that the rest of the force should follow him.

(*b*) He entered the carriage and drove off at full speed.