

ARTS DEPARTMENT.

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UNIVERSITY OF TORONTO.
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Junior Matriculation.

MATHEMATICS.—PASS.

1. Simplify

$$\frac{.8}{.3} - \frac{45}{8} \left(\frac{16}{25} - .1 \right) + \frac{\frac{3}{4}(.64 - \frac{1}{2}) \times .390625}{.11 \left(\frac{1}{3} + \frac{1}{2} \right)}$$

2. Find the square root of 5 to five decimal places, and deduce the values of

$$\sqrt{\frac{1}{5}}, \sqrt{.002}, \frac{5 + \sqrt{5}}{5 - \sqrt{5}}, \text{ and } \sqrt{6 + 2\sqrt{5}}.$$

3. (a) How much will \$1000 amount to in $2\frac{1}{2}$ years, compound interest, 4 per cent. per annum, payable half-yearly?

(b) A person pays \$292.50 for \$300 due three months hence. What rate per cent. interest does he receive?

4. What is meant by the expression, "Sterling Exchange, $9\frac{1}{2}$ p. c. premium"?

A person pays \$181.50 for £37 10s. stg. What per cent. premium is Sterling Exchange?

5. Multiply $b^2 + (a-b)(b-c)$ by $c^2 + (b-c)(c-a)$.

Shew that your answer is correct by substituting $a=2$, $b=0$, $c=-3$.

6. Simplify

$$(1) \frac{a^2 b c^{-2}}{a^{-1} b^2 c^{-3}}$$

$$(2) \frac{x^2 - 2 + x^{-2}}{x^2 - x^{-2}} - \frac{x^2}{x^2 + 1}$$

7. Resolve into factors

$$a^2 - b^2, ab + bc + ca + b^2,$$

$$a(b+c)^2 + b(c+a)^2 + c(a+b)^2 - 4abc.$$

$$(a+b)^3 - 2b \frac{a^3 - b^3}{a-b} + c(a^2 - b^2) - 2ab^2.$$

Find the Greatest Common Measure, and the Least Common Multiple of these four quantities.

8. Solve the equations

$$(1) ax + b = bx + a.$$

$$(2) \frac{1}{x^2 + 3x + 2} + \frac{1}{x^2 + 5x + 6} = \frac{1}{x^2 + x - 2}.$$

$$(3) \begin{cases} \frac{2}{x} - \frac{3}{y} = 4. \\ 2x - 3y = 2xy. \end{cases}$$

$$(4) \begin{cases} xy - yz = 18. \\ x^2 + z^2 = 4y^2 + 2xz. \\ x^2 - 8 = 2xy + 2xz. \end{cases}$$

9. There are two vessels, A' and B ; each containing a mixture of water and wine, A' in the ratio of 2:3, B in the ratio of 3:7. What quantity must be taken from each in order to form a third mixture which shall contain 5 gallons of water and 11 of wine?

10. Describe a triangle, of which the sides shall be equal to three given straight lines, any two of which are together greater than the third.

A straight line AD is divided into three equal parts by the points B and C ; on AB , BC , CD are described equilateral triangles, AEB , BFC , CGD respectively: shew that the three straight lines AE , AF , AG , can form a triangle equal in area to the equilateral triangle AEB .