MATHEMATICAL PORTIONS

OF THE

1869 MIT
ENTRANCE EXAMINATION

A Recreation Typeset in LaTeX
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A L G E B R A .

1. If $e = 8$, find the numerical value of the following expression:

$$e - \left\{ \sqrt{(e+1)} + 2 \right\} + \left(e - \sqrt[3]{e} \right) \sqrt{(e-4)}.$$

2. Simplify the following expression by removing the brackets and collecting like terms:

$$3a - \left[b + (2a - b) - (a - b) \right].$$

3. Multiply $3a^2 + ab - b^2$ by $a^2 - 2ab - 3b^2$, and divide the product by $a + b$.

4. Reduce the following fraction to its lowest terms:

$$\frac{x^6 + a^2 x^3 y}{x^6 - a^4 y^2}.$$

5. Simplify $\left\{ \dfrac{a+b}{a-b} + \dfrac{a-b}{a+b} \right\} \div \left\{ \dfrac{a+b}{a-b} - \dfrac{a-b}{a+b} \right\}.$

6. Solve $\dfrac{3x - 4}{2} - \dfrac{6x - 5}{8} = \dfrac{3x - 1}{16}.$

7. Solve $7x - 5y = 24, \quad 4x - 3y = 11.$

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ARITHMETIC.

1. Find the sum, then the difference, and then the product of $3\frac{5}{9}$ and $1\frac{7}{24}$. Divide $3\frac{5}{9}$ by $1\frac{7}{24}$.

2. Multiply 73 thousandths by 19 hundredths.

3. Divide 2880 by .0036.

4. Find the value in decimals of $\frac{1}{5} + \frac{3}{4}$.

5. What part of the month of August is $\frac{7}{18}$ minutes?

6. How many degrees in .01 of a circumference?

7. By selling a house and lot for $5,790, the owner lost $3\frac{1}{2}$ per cent. What was their cost?

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GEOMETRY.

1. Prove that the sum of the three angles of a plane triangle equals two right angles.

2. Prove that the diagonal of a parallelogram divides it into two equal triangles.

3. Prove that the area of a trapezoid is equal to the half sum of its parallel bases multiplied by its altitude.

4. Prove that the side of a regular hexagon inscribed in a circle is equal to its radius.

5. The radius of a circle equals 10. Find its area.

6. The perpendicular dropped from the vertex of the right angle upon the hypothenuse divides it into two segments of 9 and 16 feet respectively. Find the lengths of the perpendicular, and the two legs of the triangle.

7. Define similar polygons. To what are their areas proportional?

JUNE 7, 1869.