Worksheet: High School Math 100 Years Ago

This is a collection of interesting problems from real math textbooks used in the early 1900s. Problems are mostly drawn from *Advanced Algebra* by Arthur Schultze (1906), *New School Algebra* by George Wentworth (1898), and *Essentials of Plane and Solid Geometry* by David Eugene Smith (1923). All three of these books are available in their entirety online in the Internet Archive if you're curious to see them.

Logarithms:

Find the values of the following logarithms using the mantissa and characteristic.

*Full log rules can be found here (Page 372 in New School Algebra), and log tables here (Page 388 in New School Algebra). Any logarithm table found online will also work.

1. Find the logarithm of 34,237

2. Find the logarithm of 0.0015764

3. Find the logarithm of 32.6708

Ratios and Proportions:

If $a : b = c : d$, show that

1. $ac : bd = c^2 : d^2$

2. $ab : cd = a^2 : c^2$

3. $a^2 - b^2 : c^2 - d^2 = a^2 : c^2$

4. $2a + b : 2c + d = b : d$

5. $5a - b : 5c - d = a : c$

The Binomial Theorem

1. Expand $(1 + x)^{-1}$ to four terms

2. Expand $(1 - x)^{\frac{1}{2}}$ to four terms

3. Find the fourth term of $(a - \frac{3}{2\sqrt{x}})^{\frac{1}{2}}$

4. Find the fifth term of $\frac{1}{\sqrt[3]{(a-2x)^2}}$

5. Find the third term of $(4 - 7x)^{\frac{2}{7}}$

Determinants

Evaluate the following determinants:

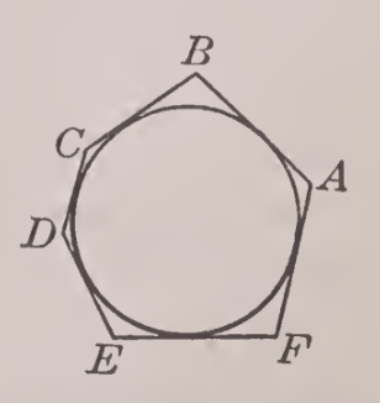
$$\begin{vmatrix} 3 & 2 & -2 & 3 \\ 4 & 3 & 7 & -2 \\ 5 & 1 & 2 & 3 \\ 6 & 2 & -3 & 1 \end{vmatrix}$$

$$\begin{vmatrix} 4 & 2 & -1 & 17 \\ 2 & 9 & 0 & 6 \\ 1 & 1 & 0 & 2 \\ 2 & 3 & 0 & 4 \end{vmatrix}$$

Geometry

1. If a quadrilateral has each side tangent to a circle, prove that the sum of one pair of opposite sides equals the sum of the other pair.

2. The hexagon here has each side tangent to the circle. Prove that AB + CD + EF = BC + DE + FA



3. Prove that if a quadrilateral has each side tangent to a circle and if the vertices are joined to the center, the sum of the angles at the center opposite any two sides is equal to a straight angle.