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The Joy of Factoring

Wagstaff

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# The Joy of Factoring

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$$\begin{array}{r} 4649 \\ \times 239 \\ \hline 41841 \\ 13947 \\ 9298 \\ \hline 1111111 \end{array}$$

$$x^4 - 1 = (x^2 + 1)(x + 1)(x - 1)$$

$$2^{58} + 1 = 5 \times 107367629 \times 536903681 = 536838145 \times 536903681$$

$$\Phi_4(2^{2j-1}) = 2^{2j-2} + 1 = (2^{2j-1} - 2j + 1)(2^{2j-1} + 2j + 1)$$

$$x^3 + 1 = (x + 1)(x^2 - x + 1) = (x + 1)(x + 1)^2 - 3x$$

$$13290059 = 3119 \times 4261$$

$$28028821 = 1065^2 + 5186^2 = 295^2 + 5286^2 = 4649 \times 6029$$

$$y^2 = x^2 - 4x + 1$$

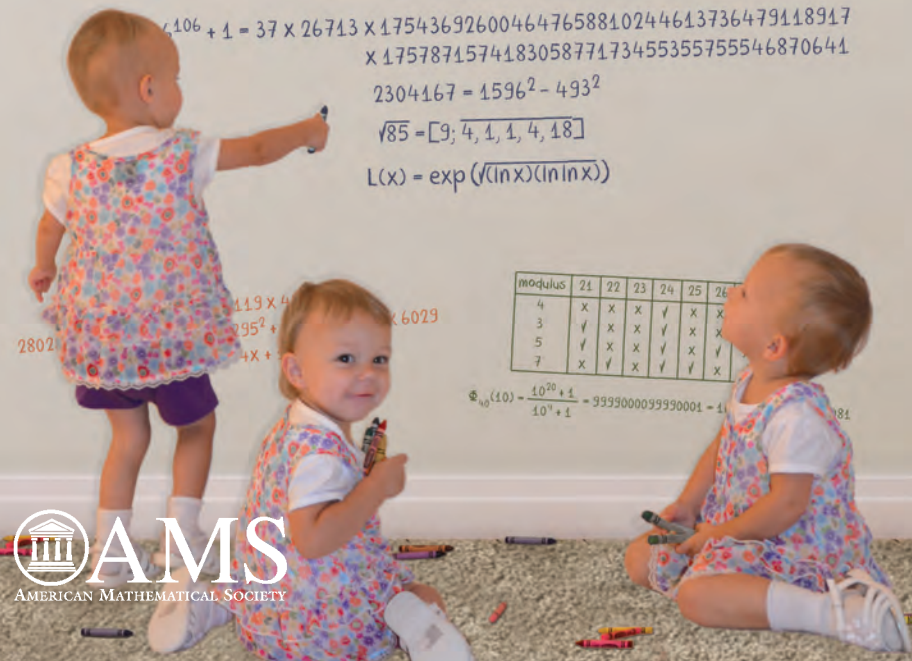
$$x^{106} + 1 = 37 \times 26713 \times 175436926004647658810244613736479118917$$

$$\times 17578715741830587717345535755546870641$$

$$2304167 = 1596^2 - 493^2$$

$$\sqrt{85} = [9; \overline{4, 1, 1, 4, 18}]$$

$$L(x) = \exp(\sqrt{(\ln x)(\ln \ln x)})$$



modulus	21	22	23	24	25	26
4	x	x	x	✓	x	x
3	✓	x	x	✓	x	x
5	✓	x	x	✓	x	✓
7	x	✓	x	✓	✓	x

	1	x	x <sup>2</sup>	x <sup>3</sup>	x <sup>4</sup>	x <sup>5</sup>	x <sup>6</sup>	x <sup>7</sup>
300,000	41 <sup>2</sup>							
300,000		41 <sup>2</sup> x						
300,000			41 <sup>2</sup> x <sup>2</sup>					
300,000				x <sup>3</sup>				
300,000					x <sup>4</sup>			
300,000						x <sup>5</sup>		
300,000							x <sup>6</sup>	
300,000								x <sup>7</sup>

$$10 = 2 \times 5 = (2 + \sqrt{-6})(2 - \sqrt{-6})$$

$$u^5 + u^4 - 4u^3 - 3u^2 + 3u + 1$$

$$x^8 - 6x^7 - 30x^6 + 216x^5 + 144x^4 - 1944x^3 + 5184x^2 + 1296$$

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