

Table : Mersenne Prime Squares + Butterfly Fractal1

		$(2y^2+y)/y$	$[2(x^2+y^2)]-1$	$z^2 - 0C$	$x^2 - CR$	$(x^2 - CR)^2$	$z^2 - PN$	$z - x$	$(z - x)^2$	$x^2 - x$			$x^2 - x$	$z^2 - 0C$		$[2(x^2+y^2)]-1$	*Butterfly Fractal ₁ Shortcuts		
		$(2x^2-x)/x$	$4CR + 1$	$xMp = 2CR + x$	$xz/Mp = (Mp+1)/2$	$CR + x$	$yMp = 2CR - y$	$yz/Mp = CR - y (Mp - 1)/2$	$CR - y$	$y^2 + y$			$y^2 + y$	$xMp = 2CR + x$		$4CR + 1$			
		$x + y = x^2 - y^2$	$xz + yz$	$x^2 + xy = 2xy + x = 2x^2 - x$	$x^2 - xy$	$xz - xy$	$y^2 + xy = 2xy - y = 2y^2 + y$	$x - 1 = (xz - 1)/(2^p + 1)$	$(yz/z)^2$	$xz - x^2$		$2^n=2^{p-1} =x$	$2^n=2^{p-1} =x$	$xz - x^2$	$x^2 + xy = 2xy + x = 2x^2 - x$	Σ =summing up the 2 ⁿ values sequentially by # of Entries.	$xz + yz$	$(2^{n+1})(2^{n+1}) = (2^p)(2^p) = (2^p)^2$	
		$2PN/2^p$	$PN + 0C$	$Mp + 0C$	PN/Mp	$(PN/Mp)^2$	$PN - Mp$	OC/Mp	$(OC/Mp)^2$	$PN-PNS$			$PN-PNS$	$CR+PNS$		$PN + 0C$	- by 4x		
	p	z	z ²	xz	x	x ²	yz	y	y ²	xy	p	2 ⁿ	2 ⁿ =	# of Entries=n, start @ x	# of Entries=n+1 # of Entries=p, start @ x	# of Entries=n+2 # of Entries=p+1, start @ x	Subtract 3·x value from the previous Σ	*Add + 1 to the Δ found in the previous Subtract 3x column	Add + 1 = z ² = MPS
#	p	Mp = 2 ^p - 1	Mp ² = MPS	PN = (2 ^{p-1})(2 ^p - 1)	2 ^{p-1} = 2 ^p /2	PNS	OC	OC/Mp	OCS	CR	p	n	2 ⁿ =x	$\Sigma 2^n = xy = CR$	$\Sigma 2^{n+1} = xz = PN$	$\Sigma 2^{n+2}$	Subtract 3x	Add + 1 = z ² = MPS	Calculation Shortcuts
1	2	3	9	6	2	4	3	1	1	2	2	1	2	2	6	14	8	9	If you know x you can quickly calculate the rest. x = 2 ⁿ and x = 2 ^{p-1} = 2 ^p /2 where p = PRIME y = x-1 z = Mp = x + y x · y = CR = x ² - x x · y = CR = y ² + y x · z = PN = x ² + xy y · z = OC = y ² + xy x ² = PNS = CR + x y ² = OCS = CR - y z ² = MPS = Mp ² *for a 2 ⁿ shortcut: add + 1 to (2 ⁿ⁺¹)(2 ⁿ⁺¹) = (2 ^p)(2 ^p) = (2 ^p) ² , subtracted by 4x. Example, if n=2, then doubling 2 ⁿ⁺¹ = 2 ⁶ then 2 ⁶ - 4x = 64-16 = 48 and 48 +1 = 49
2	3	7	49	28	4	16	21	3	9	12	3	2	4	12	28	60	48	49	
3	5	31	961	496	16	256	465	15	225	240	5	4	16	240	496	1008	960	961	
4	7	127	16129	8128	64	4096	8001	63	3969	4032	7	6	64	4032	8128	16320	16128	16129	
5	13	8191	67092481	33550336	4096	16777216	33542145	4095	16769025	16773120	13	12	4096	16773120	33550336	67104768	67092480	67092481	
6	17	131071	17179607041	8589869856	65536	4294967296	8589737985	65535	4294836225	4294901760	17	16	65536	4294901760	8589869856	17179803648	17179607040	17179607041	
7	19	524287	274876858369	137438691328	262144	68719476736	137438167041	262143	68718952449	68719214592	19	18	262144	68719214592	137438691328			274876858369	
8	31	2147483647	4611686014132420609	2305843008134952128	1073741824	1152921504606846976	2305843005992468481	1073741823	1152921502459363329	1152921503533105152	31	30	1073741824	1152921503533105152	2305843008139952128			4611686014132420609	
9	61	2305843009213693951	5316911983139663487003542222693990401	2658455991569831744654692615953842176	1152921504606846976	1329227995784915872903807060280344576	2658455991569831742348849606740148225	1152921504606846975	1329227995784915870597964051066650625	1329227995784915871750885555673497600	61	60	1152921504606846976	1329227995784915871750885555673497600	2658455991569831744654692615953842176			5316911983139663487003542222693990401	
10	89	618970019642690137449562111	38312388521647221458952746252171986755549637256619304505646776321	1915619426082361072947932378084303638130997321548169216	309485009821345068724781056	9578097130411805364739823610729476689196894323976171195136475136	1915619426082361072947932378084303638130997321548169216	309485009821345068724781055	9578097130411805364739823610729476688577924304333481057686913025	9578097130411805364739823610729476688887409314154826126411694080	89	88	309485009821345068724781056	9578097130411805364739823610729476688887409314154826126411694080	1915619426082361072947932378084303638130997321548169216			38312388521647221458952746252171986755549637256619304505646776321	
11	107	162259276829213363391578010288127	26328072917139296674479506920917283561170115423410494657557168129	13164036458569648337239753460458722910223472318386943117783728128	81129638414606681695789005144064	6582018229284824168619876730229402019930943462534319453394436096	13164036458569648337239753460458722910223472318386943117783728128	81129638414606681695789005144063	6582018229284824168619876730229329760654114249170927875384147969	6582018229284824168619876730229329760654114249170927875389292032	107	106	81129638414606681695789005144064	6582018229284824168619876730229329760654114249170927875389292032	13164036458569648337239753460458722910223472318386943117783728128			26328072917139296674479506920917283561170115423410494657557168129	
12	127	170141183460469231731687303715884105727	28948022309329048855892746252171976962977213799489202546401021394546514198529	1447401115464524427946373126085988481573677491474835808066354349131199152128	85070591730234615865843651857942052864	7237005577332262213973186563042994240829374041602535252466099000494570602496	1447401115464524427946373126085988481573677491474835808066354349131199152128	85070591730234615865843651857942052863	7237005577332262213973186563042994240659232858142066020734411696778686496769	7237005577332262213973186563042994240744303449872300636600255348636628549632	127	126	85070591730234615865843651857942052864	7237005577332262213973186563042994240744303449872300636600255348636628549632	1447401115464524427946373126085988481573677491474835808066354349131199152128			28948022309329048855892746252171976962977213799489202546401021394546514198529	

KEY: p=PRIME Mp=Mersenne Prime= 2^p - 1 Mp² = Mersenne Prime Square PN=Perfect Number = (2^{p-1})(2^p - 1) OC=ODD Complement (to PN) PNS=Perfect Number Square OCS=ODD Complement Square CR=Complement Rectangle

Table : Mersenne Prime Squares: 13 parameters of the First 12 Mersenne Primes.
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In this section, the ramifications of the Butterfly Fractal₁ are shown in tabular form. Put simply, one can take the essential idea of the Butterfly Fractal₁ : that the MPS and its tri-generational relationship of geometric areas can easily be seen as the natural interference of the PRIME wave with the exponential power of 2 wave of numbers. Indeed, one can, using nothing more than the exponential power of 2, 2ⁿ, calculate all the parameters without ever directly invoking the value of p=PRIME, bypassing the Euclid-Euler Theorem.

Calculation Shortcuts