

NOMBRES - Curiosités, théorie et usages

NOMBRES somme chiffres puissances

[Retour Page Principale](#): Somme des chiffres d'un nombre à une puissance
[Tables](#) – [Index](#)

Définition

Un nombre et ses puissances successives. La somme des chiffres de ces puissances. Quels sont ceux dont cette somme se répètent plusieurs fois.

Exemple avec le nombre 19 qui présente trois fois la même somme:

$$19 \text{ et } 1 + 9 = 10;$$

$$19^2 = 361 \text{ et } 3 + 6 + 1 = 10;$$

$$19^4 = 130321 \text{ et } 1 + 3 + 0 + 3 + 2 + 1 = 10$$

Sommaire

>>> [Table des sommes des chiffres des puissances](#)

>>> [Cas des sommes répétées plus de deux fois](#)

>>> [Nombres et ses puissances associées à une somme donnée](#)

Table des sommes des chiffres des puissances

Nombres ressentant au moins deux fois la même somme. Les sommes répétées sont en jaune.

Exemples

$2^3 = 8$	8	$3^2 = 9$	9	$4^2 = 16$	$1 + 6 = 7$
$2^9 = 512$	$5 + 1 + 2 = 8$	$3^3 = 27$	$2 + 7 = 9$	$4^5 = 1024$	$1 + 0 + 2 + 4 = 7$
		$3^4 = 81$	$8 + 1 = 9$		
		$3^5 = 243$	$2 + 4 + 3 = 9$		

Pour les nombres de 2 à 100 et les puissances de 1 à 10 (s1 à s10)

n	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10
2	[2	4	8	7	5	10	11	13	8	7]
3	[3	9	9	9	9	18	18	18	27	27]
4	[4	7	10	13	7	19	22	25	19	31]
6	[6	9	9	18	27	27	36	36	36	36]
7	[7	13	10	7	22	28	25	31	28	43]
8	[8	10	8	19	26	19	26	37	35	37]
9	[9	9	18	18	27	18	45	27	45	45]
12	[3	9	18	18	27	45	36	54	45	45]
15	[6	9	18	18	36	27	45	45	54	54]

17	[8	19	17	19	35	37	35	55	71	55]
18	[9	9	18	27	45	18	18	45	63	54]
19	[10	10	28	10	37	37	55	46	73	46]
21	[3	9	18	27	18	36	36	54	54	72]
24	[6	18	18	27	36	36	45	36	45	63]
26	[8	19	26	37	35	46	35	55	71	64]
27	[9	18	27	18	36	45	27	54	81	63]
28	[10	19	19	28	28	37	46	64	64	82]
33	[6	18	27	27	36	54	54	45	54	81]
36	[9	18	27	36	36	45	54	54	72	72]
37	[10	19	19	28	46	46	55	55	82	82]
39	[12	9	27	18	36	45	45	45	72	54]
42	[6	18	27	27	27	45	45	72	72	72]
44	[8	19	26	37	35	46	62	46	62	82]
45	[9	9	18	18	36	45	54	54	72	63]
46	[10	10	28	37	46	64	55	46	64	82]
48	[12	9	18	27	45	36	54	63	72	63]
51	[6	9	18	27	27	54	63	63	54	54]
53	[8	19	35	37	44	37	53	55	71	82]
54	[9	18	27	27	36	54	63	54	54	72]
55	[10	10	28	28	37	46	46	73	82	64]
57	[12	18	27	18	36	54	72	36	72	72]
58	[13	16	19	31	52	55	58	52	91	76]
63	[9	27	18	36	45	36	72	63	72	99]
64	[10	19	19	37	37	64	46	73	82	82]
66	[12	18	36	45	36	45	45	63	81	99]
67	[13	25	19	13	25	55	40	70	82	85]
69	[15	18	27	27	36	45	63	72	81	81]
71	[8	10	26	28	35	37	53	64	71	64]
72	[9	18	27	45	45	45	36	54	99	81]
73	[10	19	28	37	37	46	64	64	91	100]
75	[12	18	27	27	45	63	72	45	99	81]
78	[15	18	27	27	54	45	72	54	81	90]
81	[9	18	18	27	45	54	72	63	81	90]
82	[10	19	28	28	46	37	73	73	73	82]
84	[12	18	27	45	36	45	63	81	81	99]
87	[15	27	27	45	45	36	81	54	72	90]
91	[10	19	28	46	28	55	55	55	82	73]
93	[12	27	27	27	63	63	54	72	81	99]
96	[15	18	36	45	54	81	63	90	90	90]
99	[18	18	36	36	54	45	72	72	90	72]

[Haut de page](#)



Cas des sommes répétées plus de deux fois pour n de 10 à 1000

Nombre, [somme répétée, quantité de fois], [les sommes pour les puissances de 1 à 10 pour localiser le triplet]

Exemple: avec n = 12, un triplet concerne la somme 45; elle est obtenue pour les puissances (6, 9 et 10)

12, [45, 3], [3, 9, 18, 18, 27, 45, 36, 54, 45, 45]
18, [18, 3], [9, 9, 18, 27, 45, 18, 18, 45, 63, 54]
19, [10, 3], [10, 10, 28, 10, 37, 37, 55, 46, 73, 46]
24, [36, 3], [6, 18, 18, 27, 36, 36, 45, 36, 45, 63]
33, [54, 3], [6, 18, 27, 27, 36, 54, 54, 45, 54, 81]
39, [45, 3], [12, 9, 27, 18, 36, 45, 45, 45, 72, 54]
42, [27, 3], [6, 18, 27, 27, 27, 45, 45, 72, 72, 72]
42, [72, 3], [6, 18, 27, 27, 27, 45, 45, 72, 72, 72]
51, [54, 3], [6, 9, 18, 27, 27, 54, 63, 63, 54, 54]
54, [54, 3], [9, 18, 27, 27, 36, 54, 63, 54, 54, 72]
57, [72, 3], [12, 18, 27, 18, 36, 54, 72, 36, 72, 72]
66, [45, 3], [12, 18, 36, 45, 36, 45, 45, 63, 81, 99]
72, [45, 3], [9, 18, 27, 45, 45, 45, 36, 54, 99, 81]
82, [73, 3], [10, 19, 28, 28, 46, 37, 73, 73, 73, 82]
91, [55, 3], [10, 19, 28, 46, 28, 55, 55, 55, 82, 73]
93, [27, 3], [12, 27, 27, 27, 63, 63, 54, 72, 81, 99]
96, [90, 3], [15, 18, 36, 45, 54, 81, 63, 90, 90, 90]
99, [72, 3], [18, 18, 36, 36, 54, 45, 72, 72, 90, 72]
105, [45, 3], [6, 9, 27, 27, 45, 45, 45, 81, 81, 99]
117, [45, 3], [9, 27, 18, 45, 45, 54, 45, 63, 81, 117]
141, [72, 3], [6, 27, 18, 36, 45, 72, 72, 81, 72, 90]
147, [63, 3], [12, 18, 27, 54, 54, 63, 63, 63, 90, 90]
156, [99, 3], [12, 18, 36, 45, 72, 54, 72, 99, 99, 99]
165, [81, 3], [12, 18, 27, 27, 36, 54, 81, 81, 81, 108]
189, [54, 3], [18, 18, 36, 54, 54, 54, 81, 63, 90, 108]
204, [45, 3], [6, 18, 45, 45, 45, 72, 72, 108, 99, 90]
219, [27, 3], [12, 27, 27, 27, 63, 54, 63, 81, 108, 99]
249, [72, 3], [15, 9, 36, 27, 72, 54, 72, 81, 108, 72]
253, [64, 3], [10, 19, 37, 37, 64, 64, 64, 91, 91, 109]
262, [55, 3], [10, 28, 46, 55, 55, 55, 64, 91, 100, 100]
267, [27, 3], [15, 27, 27, 27, 54, 63, 81, 81, 108, 108]
333, [63, 3], [9, 27, 36, 36, 63, 63, 90, 63, 108, 135]
336, [108, 3], [12, 27, 36, 45, 54, 81, 99, 108, 108, 108]
339, [72, 3], [15, 18, 45, 36, 72, 72, 81, 72, 108, 108]
357, [81, 3], [15, 27, 45, 36, 81, 81, 90, 81, 117, 99]
379, [82, 3], [19, 19, 46, 46, 82, 73, 73, 82, 82, 109]
387, [36, 3], [18, 36, 36, 36, 54, 54, 90, 81, 117, 135]
414, [63, 4], [9, 27, 45, 63, 63, 63, 63, 108, 108, 108]
Seul cas avec quatre fois la même somme des chiffres
414, [108, 3], [9, 27, 45, 63, 63, 63, 63, 108, 108, 108]
417, [81, 3], [12, 36, 27, 36, 72, 81, 81, 90, 81, 117]

444, [63, 3], [12, 27, 45, 54, 63, 63, 81, 63, 90, 135]
 468, [18, 3], [18, 18, 18, 54, 72, 63, 90, 90, 108, 108]
 478, [73, 3], [19, 28, 28, 46, 73, 73, 73, 91, 109, 91]
 483, [90, 3], [15, 27, 45, 45, 72, 90, 90, 90, 99, 153]
 486, [90, 3], [18, 27, 36, 54, 45, 63, 90, 90, 90, 126]
 585, [18, 3], [18, 18, 18, 45, 45, 63, 81, 117, 117, 135]
 595, [73, 3], [19, 19, 37, 37, 73, 73, 73, 91, 127, 109]
 627, [99, 3], [15, 27, 45, 36, 63, 99, 72, 99, 99, 126]
 681, [81, 3], [15, 27, 27, 36, 63, 81, 81, 108, 81, 126]
 684, [63, 3], [18, 36, 18, 63, 63, 63, 90, 135, 117, 117]
 685, [28, 3], [19, 28, 28, 28, 73, 64, 91, 109, 100, 109]
 693, [90, 3], [18, 27, 36, 27, 90, 90, 108, 90, 144, 144]
 712, [109, 3], [10, 28, 37, 55, 64, 73, 100, 109, 109, 109]
 771, [108, 3], [15, 27, 27, 36, 54, 63, 108, 90, 108, 108]
 795, [117, 3], [21, 18, 45, 54, 72, 81, 72, 117, 117, 117]
 822, [72, 3], [12, 36, 36, 72, 72, 72, 90, 108, 117, 117]
 846, [81, 3], [18, 27, 45, 54, 81, 81, 81, 108, 144, 144]
 849, [108, 3], [21, 18, 36, 45, 54, 63, 108, 108, 117, 108]
 856, [109, 3], [19, 28, 28, 55, 73, 73, 109, 109, 109, 118]
 883, [109, 3], [19, 46, 55, 55, 82, 109, 91, 109, 109, 172]

Commentaires: seul 414 présente un quadruplet jusqu'à 10 000 au moins pour les dix puissances de 1 à 10.

[Haut de page](#)



Quels sont les nombres et ses puissances associées à une somme donnée

Somme, quantité de n^k ayant cette somme de chiffres pour n de 2 à 100 et les puissances de 2 à 5; liste des nombres et puissances

Exemple: avec la somme 4 on trouve: $2^2 = 4$ et $11^2 = 121 \Rightarrow 1 + 2 + 1 = 4$

Avec 5, une seule occurrence avec $2^5 = 32 \Rightarrow 3 + 2 = 5$

Avec 6, aucune possibilité pour n^k avec n jusqu'à 100 et k de 2 à 5.

Liste

4	2	[2, 2], [11, 2]
5	1	[2, 5]
7	7	[2, 4], [4, 2], [4, 5], [5, 2], [7, 4], [32, 2], [49, 2]
8	4	[2, 3], [5, 3], [8, 3], [11, 3]
9	15	[3, 2], [3, 3], [3, 4], [3, 5], [6, 2], [6, 3], [9, 2], [12, 2], [15, 2], [18, 2], [21, 2], [39, 2], [45, 2], [48, 2], [51, 2]
10	9	[4, 3], [7, 3], [8, 2], [19, 2], [19, 4], [35, 2], [46, 2], [55, 2], [71, 2]
11	1	[5, 5]
13	15	[4, 4], [5, 4], [7, 2], [16, 2], [25, 2], [29, 2], [34, 2], [38, 2], [47, 2], [52, 2], [56, 2], [61, 2], [65, 2], [67, 4], [79, 2]

14	1	[11, 5]
16	12	[11, 4], [13, 2], [14, 2], [22, 2], [23, 2], [31, 2], [41, 2], [58, 2], [59, 2], [68, 2], [85, 2], [95, 2]
17	6	[14, 3], [17, 3], [23, 3], [47, 3], [68, 3], [74, 3]
18	36	[6, 4], [9, 3], [9, 4], [12, 3], [12, 4], [15, 3], [15, 4], [18, 3], [21, 3], [21, 5], [24, 2], [24, 3], [27, 2], [27, 4], [33, 2], [36, 2], [39, 4], [42, 2], [45, 3], [45, 4], [48, 3], [51, 3], [54, 2], [57, 2], [57, 4], [63, 3], [66, 2], [69, 2], [72, 2], [75, 2], [78, 2], [81, 2], [81, 3], [84, 2], [96, 2], [99, 2]
19	28	[8, 4], [13, 3], [16, 3], [17, 2], [17, 4], [22, 3], [25, 3], [26, 2], [28, 2], [28, 3], [34, 3], [35, 4], [37, 2], [37, 3], [44, 2], [52, 3], [53, 2], [58, 3], [62, 2], [64, 2], [64, 3], [67, 3], [73, 2], [82, 2], [85, 3], [89, 2], [91, 2], [98, 2]
22	14	[7, 5], [13, 4], [14, 4], [22, 4], [31, 4], [43, 2], [52, 5], [59, 4], [74, 2], [77, 4], [85, 4], [88, 2], [92, 2], [97, 2]
23	1	[29, 5]
25	15	[13, 5], [16, 4], [22, 5], [25, 4], [29, 4], [34, 4], [38, 4], [43, 4], [52, 4], [67, 2], [67, 5], [76, 2], [77, 2], [86, 2], [94, 2]
26	16	[8, 5], [26, 3], [29, 3], [32, 3], [35, 3], [38, 3], [41, 3], [44, 3], [56, 3], [59, 3], [62, 3], [65, 3], [71, 3], [77, 3], [86, 3], [98, 3]
27	35	[6, 5], [9, 5], [12, 5], [18, 4], [21, 4], [24, 4], [27, 3], [33, 3], [33, 4], [36, 3], [39, 3], [42, 3], [42, 4], [42, 5], [48, 4], [51, 4], [51, 5], [54, 3], [54, 4], [57, 3], [63, 2], [69, 3], [69, 4], [72, 3], [75, 3], [75, 4], [78, 3], [78, 4], [81, 4], [84, 3], [87, 2], [87, 3], [93, 2], [93, 3], [93, 4]
28	22	[19, 3], [28, 4], [28, 5], [31, 3], [37, 4], [43, 3], [46, 3], [49, 3], [55, 3], [55, 4], [61, 3], [71, 4], [73, 3], [79, 3], [82, 3], [82, 4], [88, 3], [89, 4], [91, 3], [91, 5], [94, 3], [97, 3]
29	4	[14, 5], [23, 5], [32, 5], [41, 5]
31	13	[16, 5], [23, 4], [32, 4], [34, 5], [41, 4], [43, 5], [49, 4], [58, 4], [68, 4], [76, 4], [83, 2], [86, 4], [95, 4]
32	3	[47, 5], [65, 5], [74, 5]
34	7	[31, 5], [61, 4], [65, 4], [79, 4], [83, 4], [85, 5], [94, 5]
35	10	[17, 5], [26, 5], [35, 5], [44, 5], [53, 3], [62, 5], [71, 5], [83, 3], [89, 3], [95, 3]
36	18	[15, 5], [24, 5], [27, 5], [33, 5], [36, 4], [36, 5], [39, 5], [45, 5], [54, 5], [57, 5], [63, 4], [66, 3], [66, 5], [69, 5], [84, 5], [96, 3], [99, 3], [99, 4]
37	13	[19, 5], [26, 4], [44, 4], [46, 4], [53, 4], [55, 5], [62, 4], [64, 4], [64, 5], [73, 4], [73, 5], [76, 3], [98, 4]
38	1	[86, 5]
40	2	[25, 5], [61, 5]
41	4	[38, 5], [56, 5], [83, 5], [92, 5]
43	6	[47, 4], [49, 5], [56, 4], [76, 5], [92, 4], [97, 4]
44	2	[53, 5], [92, 3]
45	12	[18, 5], [48, 5], [63, 5], [66, 4], [72, 4], [72, 5], [75, 5], [81, 5], [84, 4], [87, 4], [87, 5], [96, 4]
46	4	[37, 5], [46, 5], [82, 5], [91, 4]
47	3	[59, 5], [68, 5], [77, 5]
49	4	[79, 5], [88, 5], [94, 4], [97, 5]
52	3	[58, 5], [74, 4], [88, 4]
53	2	[89, 5], [98, 5]
54	3	[78, 5], [96, 5], [99, 5]

56	1	[95, 5]
63	1	[93, 5]

[Haut de page](#)

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