The Holiday spread for School in 2022 in a country where the holiday period starts on Monday 6th June and all back to school by Monday 5th Sept. (12weeks).
Each school area have a six week holiday

This shows the 8 lots of holidays each lasting 6 weeks.
Each letter different letter indicates new school area/areas.

Weeks beginning

JUNE				JULY				AUG				
6	13	20	27	4	11	18	25	1	8	15	22	29
a	a	a	a	a	a							
	b	b	b	b	b	b						
		c	c	c	c	c	c					
			d	d	d	d	d	d				
				e	e	e	e	e	e			
					f	f	f	f	f	f		
						g	g	g	g	g	g	
							h	h	h	h	h	h

The a, b, c, d, e, f, g, h are made up from the 15 different school areas.
The 15 areas are called - North, Middle, South, West, East, Morny, Eveny, Riverside, Lakeside, Beach, Moutainside, Skyside, Grassside, Gleanend and Woodend.

A school area may be with other school areas sharing the same six weeks holiday.
From this chart you can see that on June 6th there is only one set of school area/areas on holiday.
Also you can see that on Junly 11th there are 6 sets of school areas on holiday.
Also you can see that on August 15th there are 3 sets of school areas on holiday.

Challenge 1:
These 15 different school areas have a total school population of 144000.

What sizes could the 15 school areas each be so that the total of 144000 is made up from equally spaced steps. Each of the 8 6-week slot has to have the same number of pupils?

Here is an example for only 14 school areas having a total school population of 58800.

> The 14 school areas could have the following school populations:
> 560, 1120, 1680, 2240, 2800, 3360, 3920, 4480, 5040, 5600, 6160, 6720, 7280 and 7840
> with 8400 in each of the 8 6-weeks holidays periods. 8400 can be 560 + 7840.

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[Answer: 1200, 2400, 3600, 4800, 6000, 7200, 8400, 9600, 10800, 12000, 13200, 14400, 15600, 16800, 18000]

JUNE JULY AUG
6 13 20 27 4 11 18 25 1 8 15 22 29

[---------1200 + 16800-------]

[---------2400 + 15600------]

[---------3600 + 14400------]

[---------4800 + 13200-----]

[--------6000 + 12000------]

[---------7200 + 10800------]

[---------8400 + 9600-------]

[------------18000------------]

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Looking at different ways of having the 15 school areas spread across 8 holiday-6weeks or it could have worked with 7 to show 15 ways.

[144000 div by 8=18000]

1/	8 1 1 1 1 1 1 1	e.g.	8(2250)	18000	18000	18000	18000	18000	18000	18000
2/	7 2 1 1 1 1 1 1	e.g.	6(2000)+6000	2(900)	18000	18000	18000	18000	18000	18000
3/	6 3 1 1 1 1 1 1	e.g.	6(3000)	3(6000)	18000	18000	18000	18000	18000	18000
4/	6 2 2 1 1 1 1 1	e.g.	6(3000)	2(9000)	2(9000)	18000	18000	18000	18000	18000
5/	5 4 1 1 1 1 1 1	e.g.	5(3600)	4(4500)	18000	18000	18000	18000	18000	18000
6/	5 3 2 1 1 1 1 1	e.g.	5(3600)	3(6000)	2(9000)	18000	18000	18000	18000	18000
7/	5 2 2 2 1 1 1 1	e.g.	5(3600)	2(9000)	2(9000)	2(9000)	18000	18000	18000	18000
8/	4 4 2 1 1 1 1 1	e.g.	4(4500)	4(4500)	2(9000)	18000	18000	18000	18000	18000
9/	4 3 3 1 1 1 1 1	e.g.	4(4500)	3(6000)	3(6000)	18000	18000	18000	18000	18000
10)	4 3 2 2 1 1 1 1	e.g.	4(4500)	3(6000)	2(9000)	2(9000)	18000	18000	18000	18000
11)	4 2 2 2 2 1 1 1	e.g.	4(4500)	2(9000)	2(9000)	2(9000)	2(9000)	18000	18000	18000
12)	3 3 3 2 1 1 1 1	e.g.	3(6000)	3(6000)	3(6000)	2(9000)	18000	18000	18000	18000
13)	3 3 2 2 2 1 1 1	e.g.	3(6000)	3(6000)	2(9000)	2(9000)	2(9000)	18000	18000	18000
14)	3 2 2 2 2 2 1 1	e.g.	3(6000)	2(9000)	2(9000)	2(9000)	2(9000)	2(9000)	18000	18000
15)	2 2 2 2 2 2 2 1	e.g.	2(9000)	2(9000)	2(9000)	2(9000)	2(9000)	2(9000)	2(90000	18000

Suppose it was 14 into 8 or 7 or 6

1/ 7 1 1 1 1 1 1 1
2/ 6 2 1 1 1 1 1 1
3/ 5 3 1 1 1 1 1 1
4/ 5 2 2 1 1 1 1 1
5/ 4 4 1 1 1 1 1 1
6/ 4 3 2 1 1 1 1 1
7/ 4 2 2 2 1 1 1 1
8/ 3 3 3 1 1 1 1 1
9) 3 3 2 2 1 1 1 1
10) 3 2 2 2 2 1 1 1
11) 2 2 2 2 2 2 1 1

Suppose it was 16 into 8

1/ 9 1 1 1 1 1 1 1
2/ 8 2 1 1 1 1 1 1
3/ 7 3 1 1 1 1 1 1
4/ 7 2 2 1 1 1 1 1
5/ 6 4 1 1 1 1 1 1
6/ 6 3 2 1 1 1 1 1
7/ 6 2 2 2 1 1 1 1
8/ 5 4 2 1 1 1 1 1
9/ 5 3 3 1 1 1 1 1
10) 5 3 2 2 1 1 1 1
11) 5 2 2 2 2 1 1 1
12) 4 3 3 2 1 1 1 1

13) 4 3 2 2 2 1 1 1
14) 4 2 2 2 2 2 1 1
15) 3 2 2 2 2 2 2 1
16) 2 2 2 2 2 2 2 2