

Grade 7 Maths Worksheet

Patterns

Questions:

- Below you are given a part of a calendar which shows the days from Sunday to Saturday for the month of January 2009. Part of the calendar has been highlighted. We will look at the highlighted part only.

January 2009

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 <small>New Year's Day</small>	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19 <small>Martin Luther King Jr. Day</small>	20	21	22	23	24
25	26 <small>Chinese New Year</small>	27	28	29	30	31



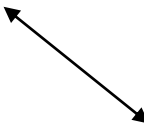
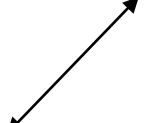
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- What do you notice about the structures in this highlighted part of the calendar?
- Will this always be the case for all calendar 3 x 3 blocks that one can highlight?
- Why are the structures the way that you found in (a)?

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Solution

1. a)

Horizontal: ± 1 	Vertical: ± 7 	Across: (Top left to bottom right) ± 8 	Across: (Top right to bottom left) ± 6 
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To move from one day to the next, we add one if we move forward, and we subtract one if we move backwards.	From one weekday to the next, we add seven if we move forward, and subtract seven when moving back up.	From top left to bottom right, we see that there is a difference of 8 moving forward (positive) and backwards (negative).	From top right to bottom left, we see that there is a difference of 6 moving forward (positive) and backwards (negative).
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We also notice that all the numbers in the middle row, middle column or a diagonal, add up to three times the middle most number.

- b) No, not always. The only problem is the calendars where the first day of the month is not on a Monday. We also have leap years where February at times has only 28 days, and the maximum number of days in a month will be 31. We have to look at the structure of the calendar with the middle most number marked n .

$n-8$	$n-7$	$n-6$
$n-1$	n	$n+1$
$n+6$	$n+7$	$n+8$

- c) Because we have a 7 day week, and after 7 days the days are repeated. Days in the week also follow consecutively. The diagonals work on Monday week one to Tuesday week two which is 8 days. To get from Friday week one to Thursday week two, you only have a difference of 6 days

This activity can be applied over the whole Senior Phase, with different levels of sophistication in the arguments at different grade levels.

The idea is to get to the following numbers without necessarily using algebraic equations. Learners can work from the middle outwards by trial and error.

$$\begin{aligned} n-8 \geq 1 &\rightarrow n \geq 9 \\ n+8 \leq 28 &\rightarrow n \leq 20 \\ n+8 \leq 31 &\rightarrow n \leq 23 \end{aligned}$$