

## Mathematics Investigation Year 8

# Opposite Corners

Here the numbers are arranged in 10 columns:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

In the 2 x 2 square

$$7 \times 18 = 126$$

$$8 \times 17 = 136$$

the difference between them is 10

7	8
17	18

In the 3 x 3 square

$$12 \times 34 = 408$$

$$14 \times 32 = 448$$

the difference between them is 40

12	13	14
22	23	24
32	33	34

Investigate to see if you can find any rules or patterns connecting the size of the square chosen and the difference.

If you find a rule, use it to predict the difference for larger squares.

Test your rule by looking at squares like 8 x 8 or 9 x 9.

Can you generalise the rule?

[What is the difference for a square of size  $n \times n$ ?]

x		?
?		?

Can you prove the rule?

Hint: In a 3 x 3 square.....

What happens if the numbers are arranged in six columns or seven columns?

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	--	--	--	--	--
--	--	--	--	--	--

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	--	--	--	--	--	--
--	--	--	--	--	--	--