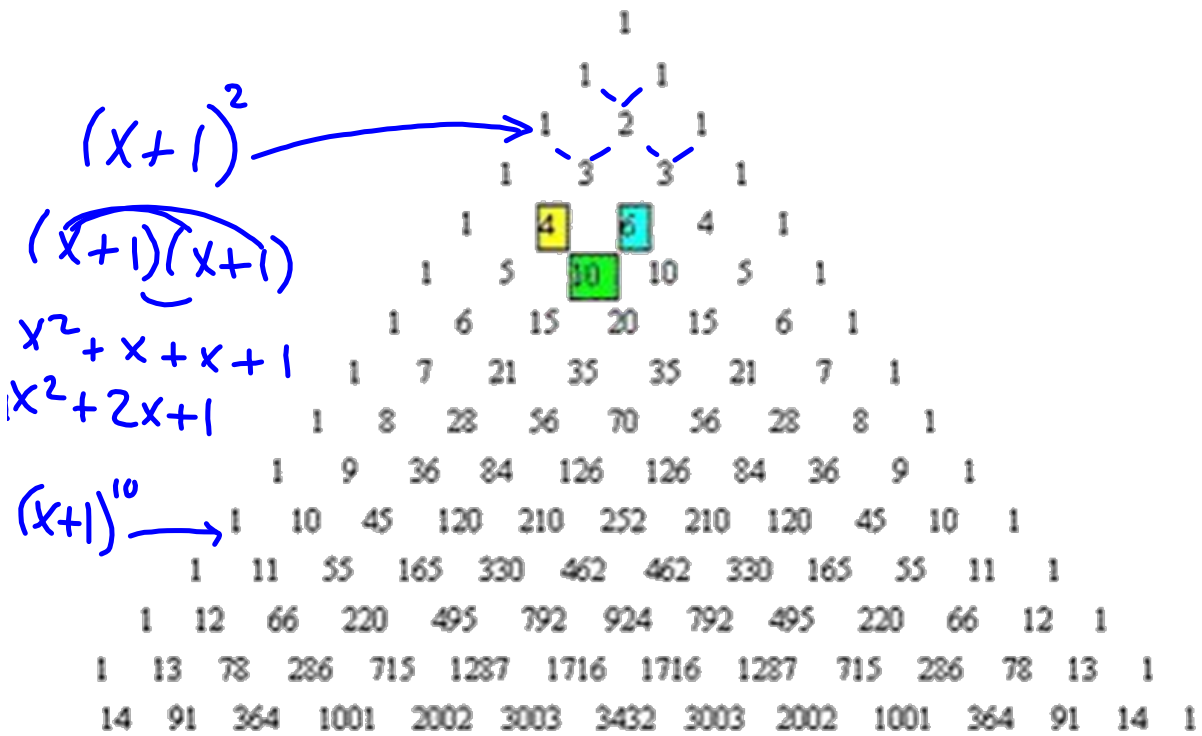


Section 4.1

Writing Equations to Describe Patterns

Pascal's Triangle showing the first 14 rows. The numbers are arranged in a triangular pattern. The numbers 4, 6, and 10 are highlighted in yellow, cyan, and green boxes respectively.

				1													
				1	1												
				1	2	1											
				1	3	3	1										
				1	4	6	4	1									
				1	5	10	10	5	1								
				1	6	15	20	15	6	1							
				1	7	21	35	35	21	7	1						
				1	8	28	56	70	56	28	8	1					
				1	9	36	84	126	126	84	36	9	1				
				1	10	45	120	210	252	210	120	45	10	1			
				1	11	55	165	330	462	462	330	165	55	11	1		
				1	12	66	220	495	792	924	792	495	220	66	12	1	
				1	13	78	286	715	1287	1716	1716	1287	715	286	78	13	1
14	91	364	1001	2002	3003	3432	3003	2002	1001	364	91	14	1				



Look at each figure is there a pattern?

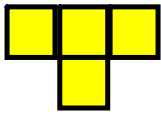


Figure 1

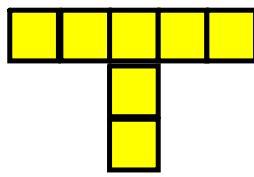


Figure 2

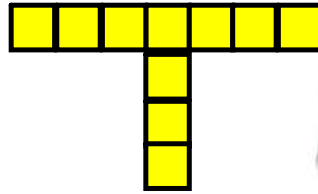


Figure 3



See next slide if you need more help seeing the pattern

Figure #	# of Blocks
<u>1</u>	<u>4</u>
<u>2</u>	<u>7</u> $\swarrow +3$
<u>3</u>	<u>10</u> $\swarrow +3$
6	<u>19</u>
100	<u> </u>

4 13

5 16

Let's look at it again.

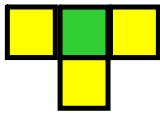


Figure 1

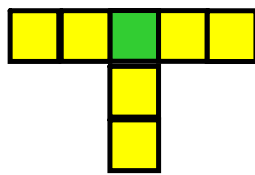


Figure 2

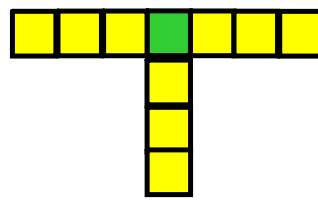


Figure 3

Figure #	# of Blocks
0	
1	4
2	7
3	10
6	19
10	31
f	_____

THUS

Write an equation that relates the number of blocks, n, to the figure number, f.

$$n = 3f + 1$$

(Common difference) x Figure + #

$$\begin{aligned} n &= 3(6) + 1 \\ &= 18 + 1 \\ &= 19 \end{aligned}$$

$$\begin{aligned} n &= 3(10) + 1 \\ &= 30 + 1 \\ &= 31 \end{aligned}$$

Is there a pattern?



Figure #	# Circles
0	-1
1	1
2	3
3	5
4	7
10	19
f	2f-1

$$C = 2f - 1$$

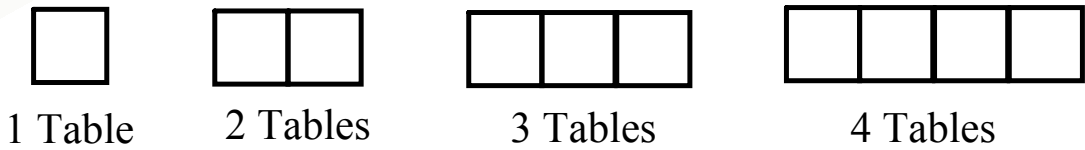
Write an equation that relates the number of circles, c, to the figure number, f.









How many people can sit at the tables?
(only one person per edge)

Table Seating



6 # of tables	2 # of people	Pattern
1	4 	$2(1) + 2$
2	6 	$2(2) + 2$
3	8 	$2(3) + 2$
4	10 	$2(4) + 2$
:		
:		
t		$2(t) + 2$

Try these

For $n = 2$, solve for each of the following

1) $P = 5n + 6$

$$\begin{aligned} &= 5(2) + 6 \\ &= 10 + 6 \\ &= 16 \end{aligned}$$

2) $K = 4n - 1$

$$\begin{aligned} &= 4(2) - 1 \\ &= 8 - 1 \\ &= 7 \end{aligned}$$

3) $W = 10n - 5$

$$\begin{aligned} &= 10(2) - 5 \\ &= 20 - 5 \\ &= 15 \end{aligned}$$

For $n = -5$, solve for each of the following

1) $P = 5n + 6$

$$\begin{aligned} P &= 5(-5) + 6 \\ &= -25 + 6 \\ &= -19 \end{aligned}$$

2) $K = 4n - 1$

$$\begin{aligned} &= 4(-5) - 1 \\ &= -20 - 1 \\ &= -21 \end{aligned}$$

3) $W = 10n - 5$

$$\begin{aligned} &= 10(-5) - 5 \\ &= -50 - 5 \\ &= -55 \end{aligned}$$

Class/Homework

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