Section 4.1
Writing Equations to Describe Patterns

```
                              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
```
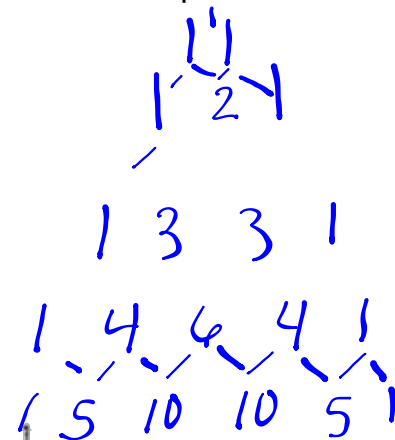
$$(x+1)^4$$

$$1x^4 + 4x^3 6 + x^2 + 4x + 1$$

Fibonacci Sequence

```
                          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
```
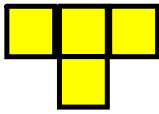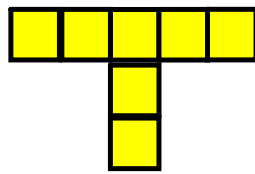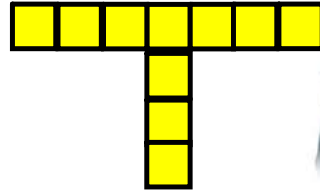
1
1 1
1 2 4
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
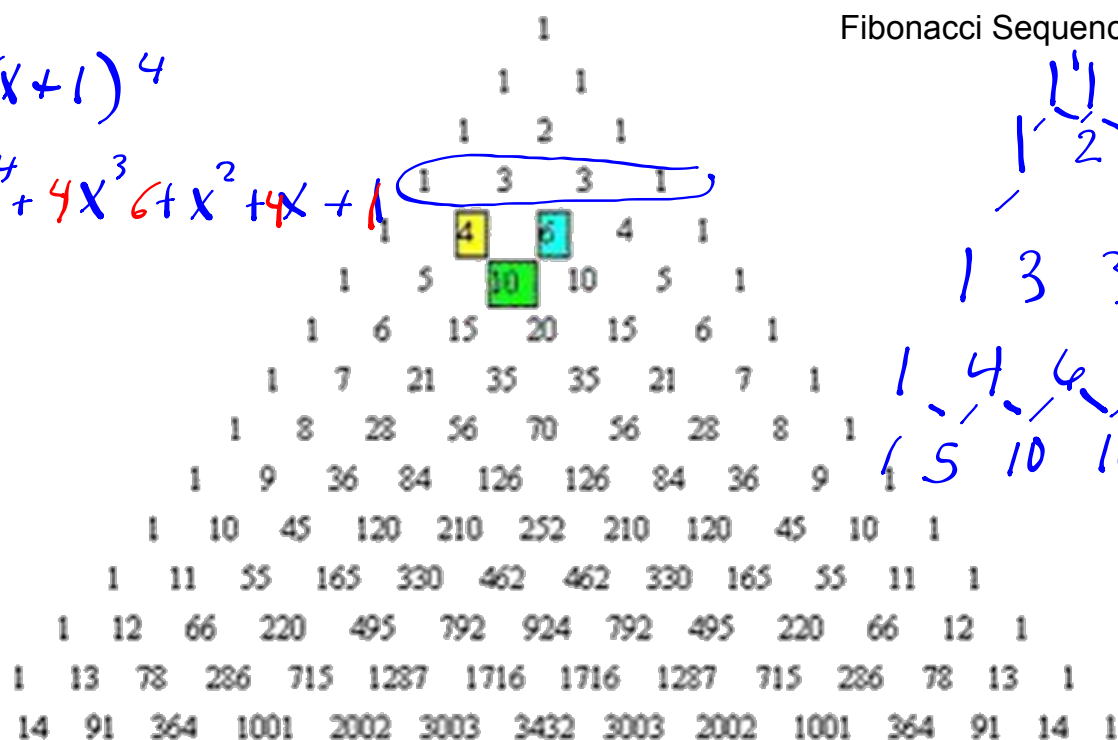
Look at each figure is there a pattern?

Figure 1

Figure 2

Figure 3

See next slide if you need
more help seeing the pattern

Figure # x	# of Blocks y
1	4
2	7
3	10
6	19
100	301

$)+3$
$)+3$

$y = 3 x + 1$

$y = 3(6) + 1$
$= 18 + 1$
$= 19$

$y = 3(100) + 1$
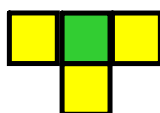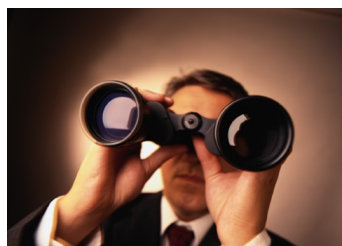$= 300 + 1$
$= 301$

Let's look at it again.

Figure 1

Figure 2

Figure 3

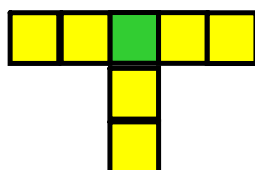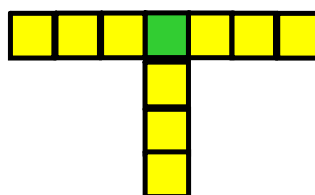| Figure #	# of Blocks
1	4
2	7
3	10
6	19
10	301
f	____

THUS

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

$$n = 3f + 1$$

(Common difference) x Figure + #

Is there a pattern?

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

$+2$
$+2$
$+2$

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

$$C = 2f - 1$$

Some thinking strategies
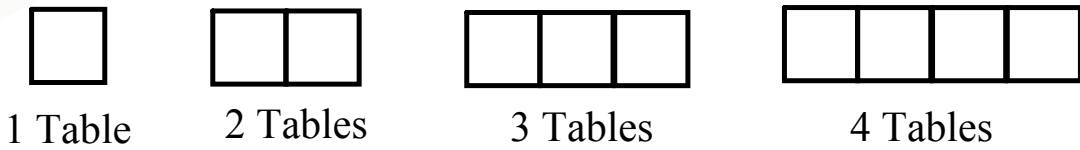
* 1+ 0   f +(f-1)
  2 + 1   2f -1
  3 + 2
  4 + 3

* the #circles is always 1 smaller than twice the figure number   (2f-1)

$$C = 2(10) - 1$$
$$= 20 - 1$$
$$= 19$$

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

Table Seating

1 Table   2 Tables   3 Tables   4 Tables

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

Try these

For n = 2, solve for each of the following

1) P = 5n +6   2) K = 4n-1   3) W= 10n - 5

$$P = 5(2) + 6$$
$$= 10 + 6$$
$$= 16$$

$$= 4(2) - 1$$
$$= 8 - 1$$
$$= 7$$

$$= 10(2) - 5$$
$$= 20 - 5$$
$$= 15$$

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

1) P = 5n +6   2) K = 4n-1   3) W= 10n - 5

$$= 5(-5) + 6$$
$$= -25 + 6$$
$$= -19$$

$$= 4(-5) - 1$$
$$= -20 - 1$$
$$= -21$$

$$= 10(-5) - 5$$
$$= -50 - 5$$
$$= -55$$

Class/Homework

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