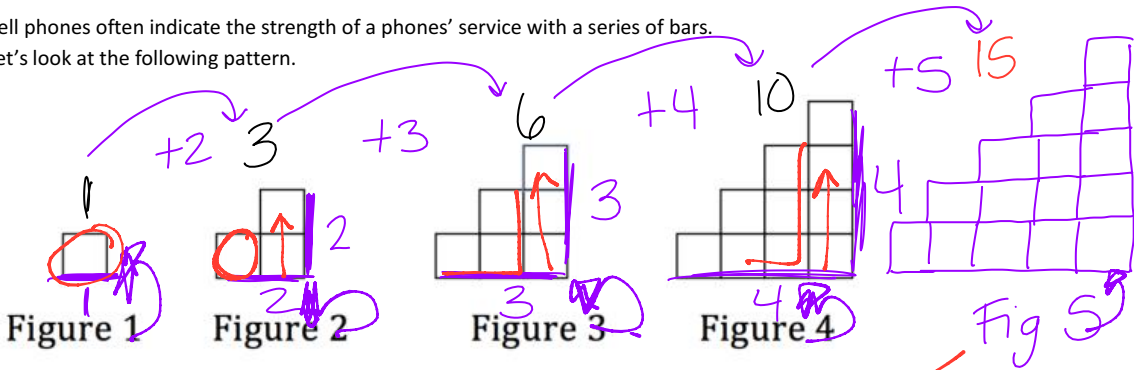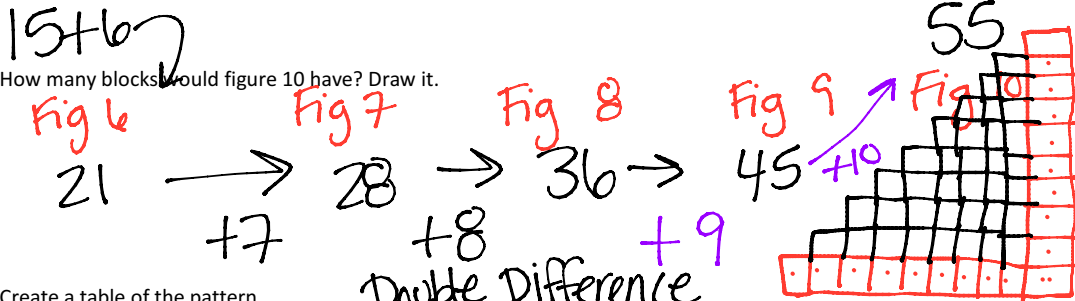Cell phones often indicate the strength of a phones' service with a series of bars.
Let's look at the following pattern.

+2 3   +3   6   +4   10   +5 15

2   3   4

Figure 1   Figure 2   Figure 3   Figure 4   Fig 5

1) Assuming that the pattern continues, create the next figure.

15+6

2) How many blocks would figure 10 have? Draw it.

Fig 6   Fig 7   Fig 8   Fig 9 → Fig 10

21 → 28 → 36 → 45 +10   55

+7   +8   +9

Double Difference

3) Create a table of the pattern.

Figure #	# of squares
1	1
2	3
3	6
4	10
5	15
6	21
7	28
8	36
9	45
10	55
11	66

+2 > +1
+3 > +1
+4 > +1
+5 > +1
+6 > +1
+7 > +1
+8 > +1
+9 > +1
+10 > +1
+11 > +1

*2nd
difference

*Quadratic

Looking at the table to the left, is there a pattern that you see? In words, describe what is happening to get to the next picture. For example, do you want to draw out 154 pictures to get the 154th image?
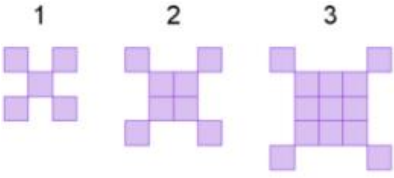
Fill in
154 boxes

Add 154 boxes to image 153

Figure #	1	2	3	4	5	6	7	8	9
# of squares	5	8	13	20	24	40	53	68	85

+3 +5 +7 +9 +11 +13 +15 +17
+2 (+2)
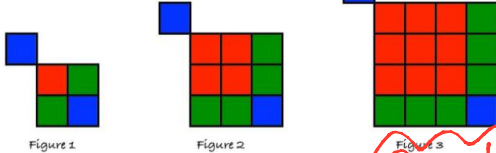
Figure #	1	2	3	4	5	6	7	8	9
# of squares	5	10	17	26	37	50	65	82	101

Quadratic

+5 +7 +9 +11 +13 +15 +17 +19
+2 +2 (+2)
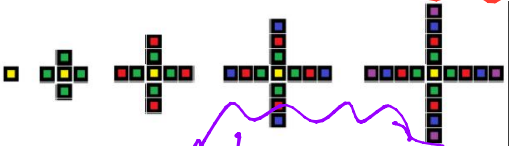
Figure #	1	2	3	4	5	6	7	8	9
# of squares	1	5	9	13	17	21	25	29	33

Linear

+4 +4 +4 +4

For each of the tables below, look at the **y-value column** or **row**. Find the difference. Then if needed, find the 2nd difference. Based on that information, **label** them as **linear**, **exponential** or **quadratic** (this is the new one).

Quadratic

x	y
0	24
1	6
2	0
3	6
4	24
5	54

-18 +12
-6 +12
+6 +12
+18 +12
+30

Quadratic

x	y
1	5
2	20
3	45
4	80
5	125
6	180
7	245
8	320

+15 +10
+25 +10
+35 +10
+45 +10
+55 +10
+65 +10
+75

Linear (double diff)

x	y
-2	-5
-1	-2
0	1
1	4
2	7
3	10

+3
+3
+3
+3
+3

Exponential

x	y
-1	½
0	1
1	2
2	4
3	8
4	16

×2 ×2 ×2 ×2 ×2

Quadratic

x	-2	-1	0	1	2	3	4
y	4	1	0	1	4	9	16

-3 -1 +1 +3 +5 +7
+2 +2 (+2)

y values repeat

Quadratic

| x	-2	-1	0	1	2
y	-1	2	3	2	-1

+3 +1 -1 -3
-2 -2 -2

Marco has started a new blog about sports at Imagination High School (mascot: the fighting unicorns) that he has decided to call "I Site". He created a logo for the web site that looks like this:

SITE

He is working on creating the logo in various sizes to be placed on different pages on the website. Marco developed the following designs:

Size 1   Size 2   Size 3   Size 4

7   12   17   22

+2 -5 ↖ 7
size 0

+5
Slope
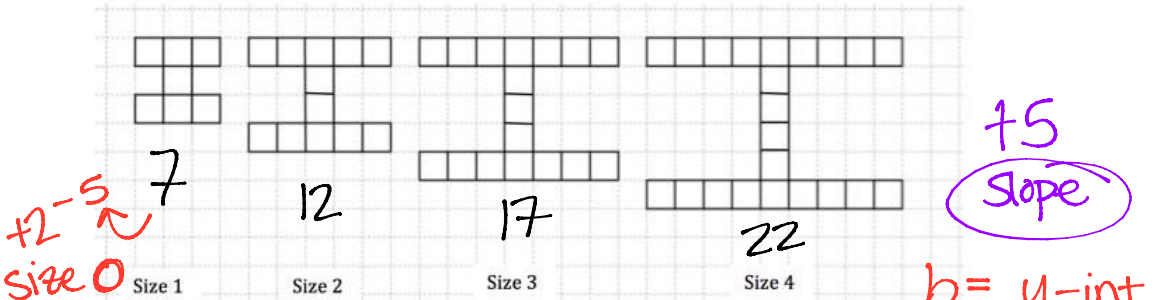
b= y-int
0 term

1) Can you come up with a model/equation that could fit this?

$$y = mx + b$$

$$y = 5x + 2$$

Common diff = slope

0 term = 0

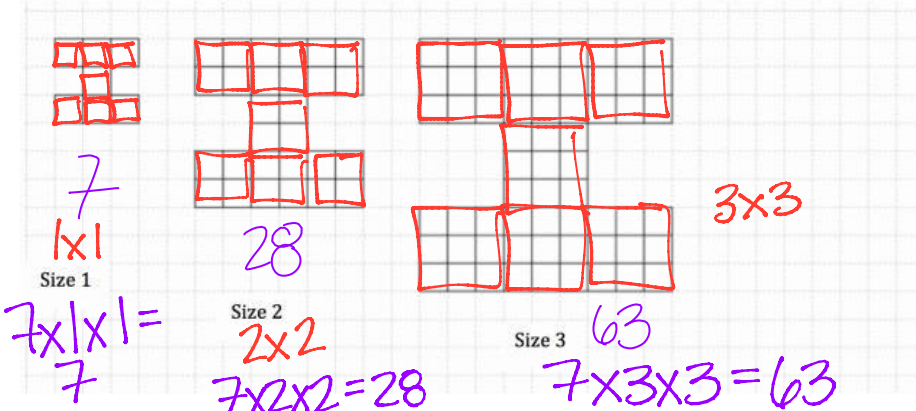| x	y	
0	2	+5
1	7	+5
2	12	+5
3	17	+5
4	22	

2) How many squares will be needed to create the size of the 100 logo?

$$y = 5x + 2$$

$$5(100) + 2 = 502$$

Linear

Marco decides to experiment with making his logo "blockier" so that it looks stronger. Here's what he came up with:

7
1x1
Size 1

7x1x1=
7

28
Size 2
2x2
7x2x2=28

3x3
Size 3
63
7x3x3=63

3) Assuming that this pattern is good, draw what the image would look like for size #4 on the grid below. How many blocks make up this pattern?
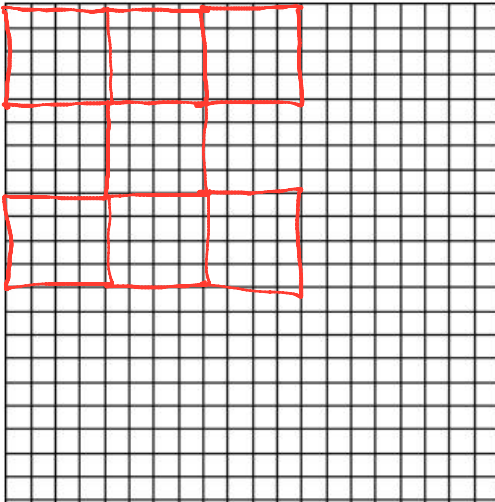
4x4

$7 \times 4 \times 4 = 112$

≈ 112 blocks

4) Can you come up with a model/method to figure out an equation for this?

$y = 7x^2$ (same # twice)

$7 \times 10 \times 10 = 700$ blocks

5) How are the logos in this different? How are they similar?

Adding
vs Multiply
Linear
vs. Quadratic

→ Adding blocks
→ Shapes
→ logo gets bigger