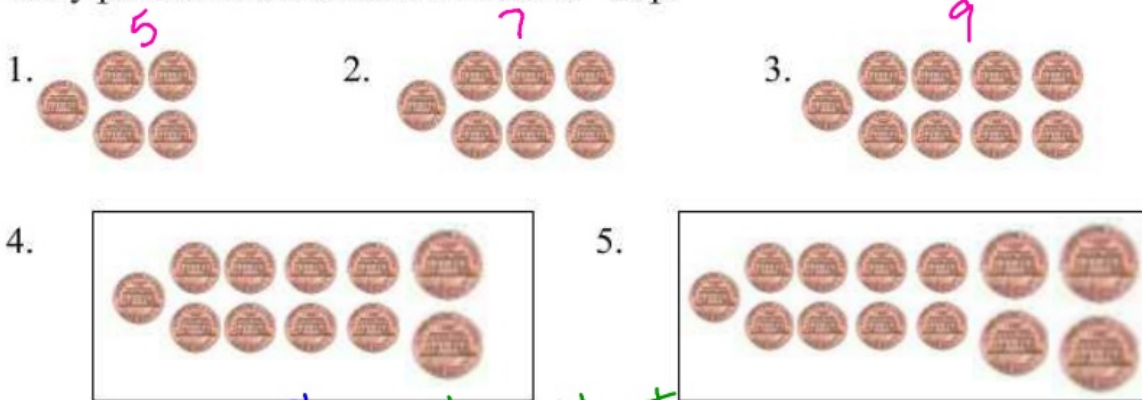# Linear Growth using Pictures

Pattern 1 (Day 1 – class notes)

Recreate each pattern, and sketch the 4th and 5th pattern. Then predict how many pennies will be needed in the 10th step.
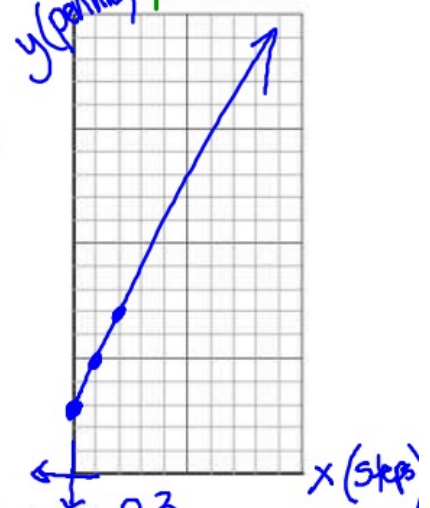
1. *(handwritten: 5)*

2. *(handwritten: 7)*

3. *(handwritten: 9)*

4.

5.

Step	0	1	2	3	4	. . .	10	x
Number of pennies	3	5	7	9	11		23	$\frac{2}{1}x + 3$

(handwritten annotations: +1, +1, +1; −2, +2, +2, +2)

How is the pattern changing? __*2 pennies / 1 step*__

How many piece(s) were there in the beginning (step 0)? **3**

Write an equation $(y = mx + b)$ to represent the pattern $y = \frac{2}{1}x + 3$ $\Big| P = \frac{2}{1}S + 3$
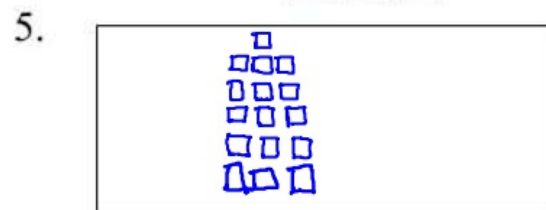
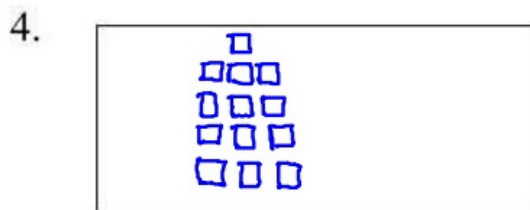*(handwritten axis labels: y (pennies), x (steps))*

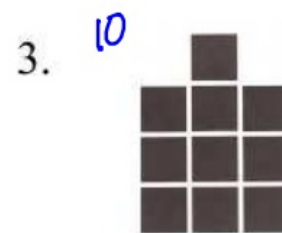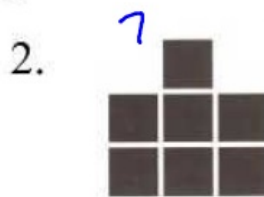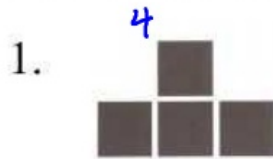Draw a graph of the pattern

How many pennies would you need to construct the 10th step? __**23**__

$$P = \frac{2}{1}(10) + 3$$
$$P = 20 + 3 = \boxed{23}$$

Pattern 2 (Day 1 – class notes)

Recreate each pattern, and sketch the 4th and 5th pattern. Then predict how many blocks will be needed in the 10th step.

1. **4**

2. **7**

3. **10**

4.

5.

Step	0	1	2	3	4	. . .	10	x
Number of blocks	1	4	7	10	13		31	$\frac{3}{1}x + 1$

$+3$ $+3$
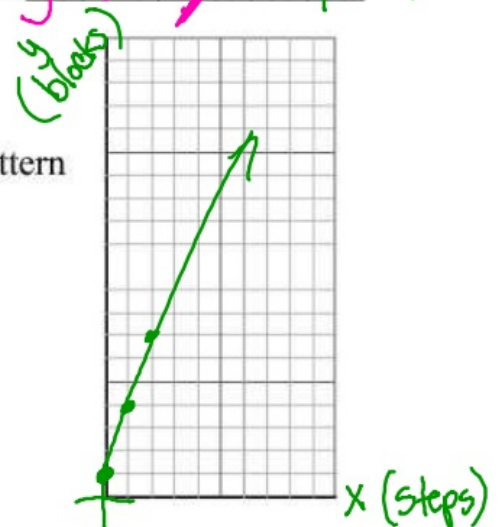
How is the pattern changing? **3 blocks / 1 step**

How many piece(s) were there in the beginning (step 0)? **1**

Write an equation $(y = mx + b)$ to represent the pattern $y = \frac{3}{1}x + 1$ $b = \frac{3}{1}s + 1$

y (blocks)

Draw a graph of the pattern

x (steps)

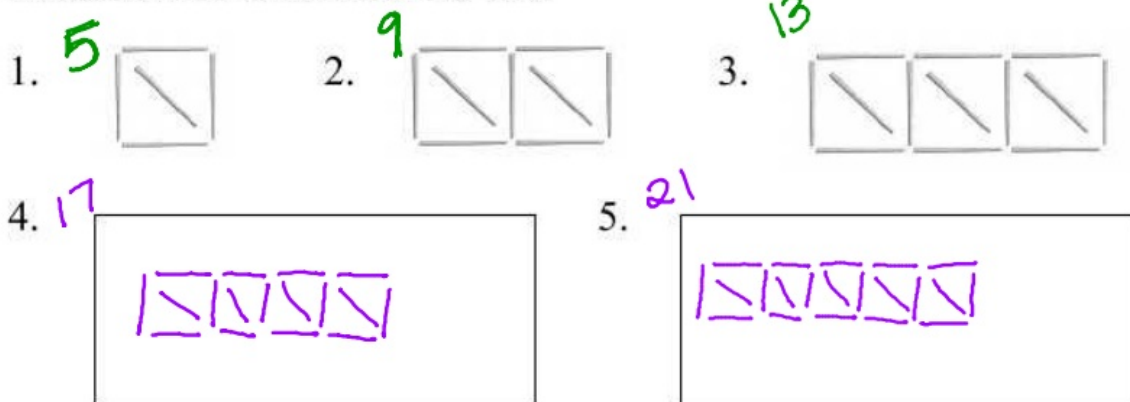How many blocks would you need to construct the 10th step? **31**

$b = \frac{3}{1}(10) + 1$

$b = 30 + 1 = 31$

Pattern 3 (Day 1 – class notes)

Recreate each pattern, and sketch the 4th and 5th pattern. Then predict how many toothpicks will be needed in the 10th step.

1. **5** [square with diagonal]

2. **9** [two squares with diagonals]

3. **13** [three squares with diagonals]

4. **17** [box with sketched pattern]

5. **21** [box with sketched pattern]

Step	0	1	2	3	4	. . .	10	x
Number of toothpicks		5	9	13	17		41	$\frac{4}{1}x+1$

How is the pattern changing? $\dfrac{4 \text{ toothpicks}}{1 \text{ step}}$

How many piece(s) were there in the beginning (step 0)? **1**

Write an equation $(y = mx + b)$ to represent the pattern $y=\frac{4}{1}x+1 \Big/ tp=\frac{4}{1}s+1$

Draw a graph of the pattern
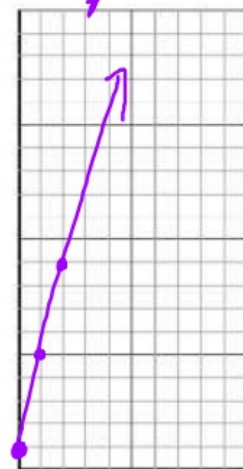
How many toothpicks would you need to construct the 10th step? **41**

$tp=\frac{4}{1}(10)+1$

$tp=40+1=41$