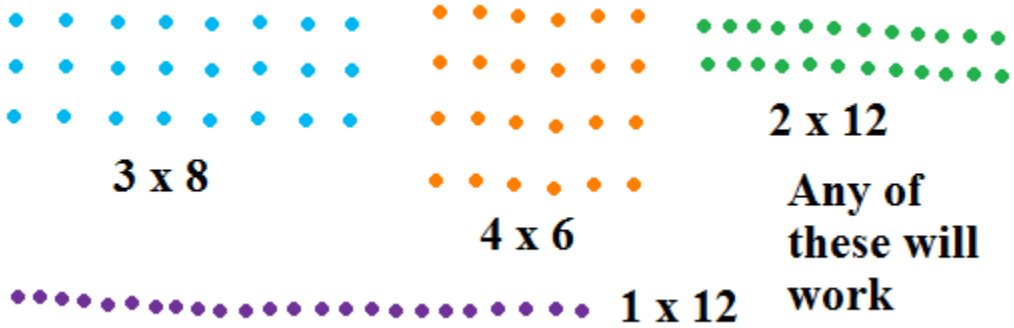
4th grade Algebraic Thinking **SAMPLE SOLUTIONS**

1. Make an array to show how you will arrange 24 chocolates in a box (Adapted from Fosnot and Jacob, 2010)



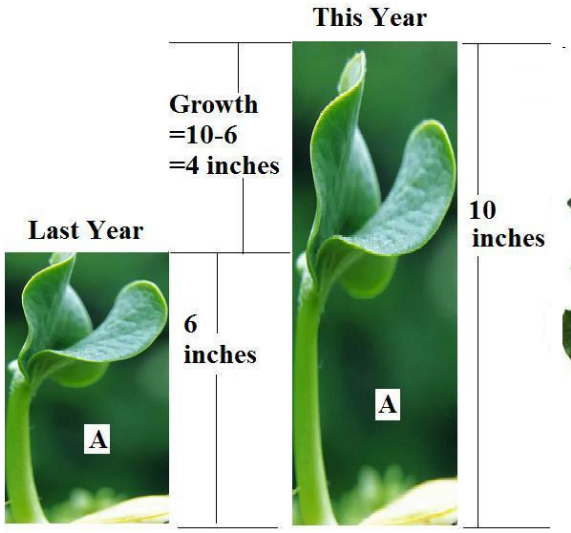
2. I have 2 pets and my friend has 3 times as many pets. How many pets does my friend have? Show your work. *(Answer is 2+2+2=6)*

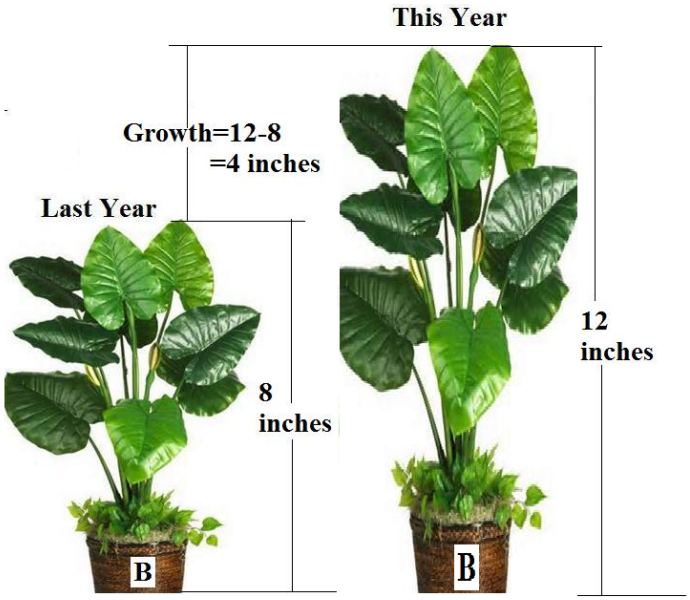
3. This month, I saved 4 times as much money than last month. If I saved $5.00 last month. How much money did I save this month?


Last Month $5

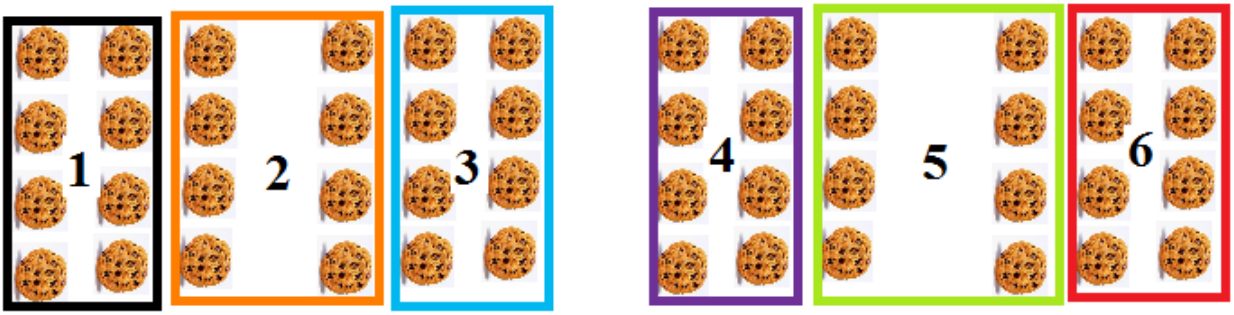

This Month $20

4. There were two plants. One plant A was six inches long and the other plant B was 8 inches long. A year later, Plant A was 10 inches long and Plant B was 12 inches long. Which one grew more? *(They both grew 4 inches)*



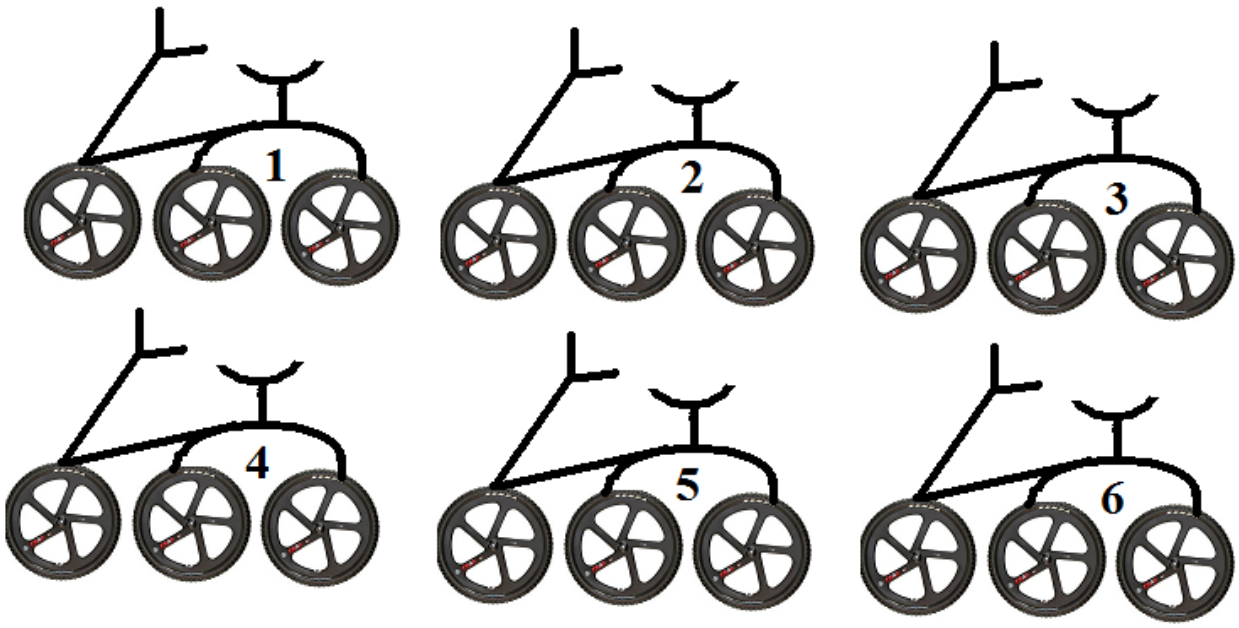


5. Grandma baked 4 dozen cookies. She gave each of her friends 8 cookies. How many friends did grandma share the cookies with? *(6 Friends)*



6. There are 50 kids going on a field trip. Each Van can hold only 8 children. How many vans will be needed for the fieldtrip?

7. You go to a shop that sells tricycles. There are 18 wheels in the Wheel Shop. How many tricycles are in the shop? Explain how you know. *(6 tricycles)*



8. The Wheel Shop sells other kinds of vehicles. There are bicycles and go-carts in a different room of the shop. Each bicycle has only one seat and each go-cart has only one seat. There are a total of 21 seats and 54 wheels in that room. How many are bicycles and how many are go-carts? Explain how you figured it out.

The number of vehicles is the same as the number of seats so there are 21 vehicles. The total number of wheels in the room is twice the number of bikes plus 4 times the number of Go-Carts. So we need two numbers whose sum is 21. In addition 2 times the first number (For the bikes) plus 4 times the second number (for the Go-Carts) equals the total number of wheels which is 54. We found the answer by trial and error noting that for each guess we could make the next guess have either more wheels or fewer wheels by increasing the number of Go-Carts or decreasing the number of Go Carts respectively:

# of BIKES	**# Go-Carts**	***BIKE WHEELS***	***Go-CART WHEELS***	***TOTAL WHEELS***	***NOTE***
10	*11*	*20*	*44*	*64*	*Too Many Carts*
17	*4*	*34*	*16*	*50*	*Too Few Carts*
14	*7*	*28*	*28*	*56*	*Too Many Carts but close!*
15	*6*	*30*	*24*	*54*	*CORRECT*

9. Find all the factors for the number 36.

I need all the numbers that divide into 36 evenly so I start checking beginning at 1. However, since 36 is divisible by 3 and by 2, I can stop checking at 36÷3=12 since the only factors beyond this are 36÷2=18 and 36÷1=36(The factors are in green).

NUMBER	**FACTOR?**	**NUMBER**	**FACTOR?**
1	***YES***	***2***	***YES***
3	***YES***	***4***	***YES***
5	*NO*	***6***	***YES***
7	*NO*	*8*	*NO*
9	***YES***	*10*	*NO*
11	*NO*	***12***	***YES***
18	***YES***	***36***	***YES***

10. The rule is to add 5 to the number. Complete the numbers in the box by adding 5 to each number. *(The new numbers are in green)*

INPUT	OUTPUT RULE ADD 5
1	6
2	7
3	**8**
4	9
5	**10**

What patterns do you notice? Can you predict if the 7th number will be odd or even?

- *The output column counts sequentially but starts at 6 rather than 1.*
- *The output minus the input is always 5.*
- *The sum of the two columns starts at 7 and goes up by 2 and thus is always odd.*
- *Since the sum of the two columns is always odd when the input is odd the output must be even and when the input is even the output must be odd. Thus the 7th number will be even.*