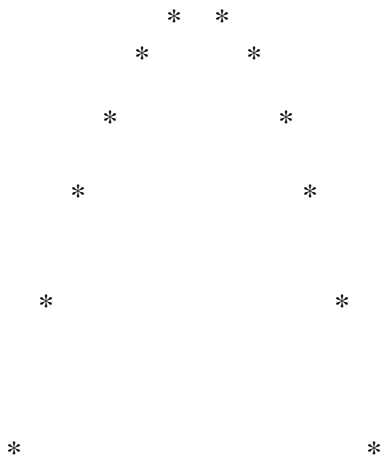


1 partridge × 12 days = 12	(1, 12)
2 turtle doves × 11 days = 22	(2, 22)
3 French hens × 10 days = 30	(3, 30)
4 Calling birds × 9 days = 36	(4, 36)
	...
	(11, 22)
	(12, 12)

OK, now let's graph the ordered pairs (x, y) , where x is the multiplicity of the item received each day, and y is the total number of this gift received. The graph looks like this:



Does this look familiar? Can we find its equation? Let's try using our algebra skills. Since it appears that it might be a quadratic function (specifically, a parabola), we will try

$$f(x) = ax^2 + bx + c$$

And let's use any three points that we know lie on that curve, say $(1, 12)$, $(2, 22)$ and $(9, 36)$, to solve the system of equations:

$$\begin{aligned} 12 &= a(1)^2 + b(1) + c \\ 22 &= a(2)^2 + b(2) + c \\ 36 &= a(9)^2 + b(9) + c \end{aligned}$$

Your students will undoubtedly find many different ways (substitution, addition/subtraction, matrices, determinants, etc.) to solve this system and will find that

$$a = -1; \quad b = 13; \quad \text{and} \quad c = 0$$

Our quadratic function then becomes $f(x) = -1x^2 + 13x + 0$. Have each of your students check a different ordered pair to help them see that this function is indeed the one for which we searched.

Depending on their background in the graphing calculator or other technology (and your preference for using the grapher), students may determine this same function directly by finding the quadratic regression line (curve of best fit) for this set of ordered pairs by using the statistics mode (scatter plot and then the graph) on their calculator. (All of your students must eventually become fluent in the use of this technology.)