

Title: 2.4 Modeling with Quadratic Function Notes

Alg 2 Date _____

Task 1:

Writing Quadratic Equations

Given a point and the vertex (h, k)

(x, y) (h, k)

Use vertex form:

$y = a(x - h)^2 + k$

Given a point and x-intercepts p and q

(x, y) $(p, 0)$ $(q, 0)$

Use intercept form:

$y = a(x - p)(x - q)$

Given three points

$ax^2 + bx + c = y$

Write and solve a system of three equations in three variables.

Write an equation of the parabola that passes through the point $(-1, 2)$ and has a vertex at $(4, -9)$.

$y = a(x-h)^2 + k$
 $2 = a(-1-4)^2 - 9$
 $2 = a(-5)^2 - 9$
 $2 = 25a - 9$
 $11 = 25a$
 $\frac{11}{25} = a$

$y = \frac{11}{25}(x-4)^2 - 9$

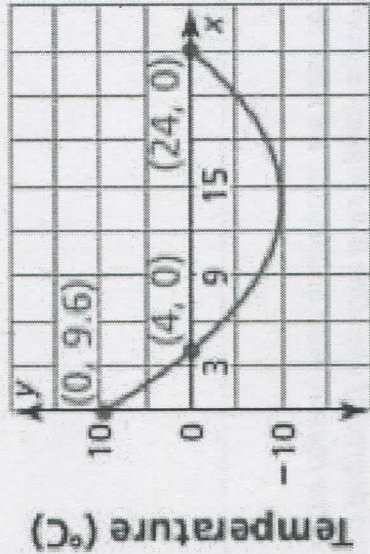
Task 2:

A meteorologist creates a parabola to predict the temperature tomorrow, where x is the number of hours after midnight and y is the temperature (in Celsius). Write a function, f , that models the temp over time. What is the coolest temp?

$f(x) = a(x-p)(x-q)$
 $9.6 = a(0-4)(0-24)$
 $(9.6) = a(-4)(-24)$
 $9.6 = 96a$
 $\frac{9.6}{96} = a$
 $\frac{1}{10} = a$

$f(x) = \frac{1}{10}(x-4)(x-24)$

Temperature Forecast



Hours after midnight

FINITE DIFFERENCE

You have been doing finite differences for years without even knowing it. When you found slope from a table you were doing finite differences. Now dealing with quadratics we use finite differences again, but now we do it twice.

With linear functions slope is constant after the first differences because it has a degree of one. One is its highest exponent. Quadratics have a degree of two, meaning its biggest exponent is a two. This is the reason, with quadratics, we need to subtract the y-values twice before finding a constant value.

Task 3:

Show the data below is quadratic by using finite differences.

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

Linear \checkmark -5 \checkmark -3 \checkmark -1 \checkmark 1 \checkmark 3 \checkmark 5
Quadratic \checkmark 2 \checkmark 2 \checkmark 2 \checkmark 2 \checkmark 2

Task 4:

Find the first and second differences to determine the type of function. Then write a function for the data provided.

x	10	20	30	40
f(x)	4.4	24.3	84.1	183.8

\checkmark -19.9 \checkmark -59.8 \checkmark -99.7
 \checkmark 39.9 \checkmark 39.9

Still struggling with: