Name: _____ Date: _____

Class: _____ Teacher: _____

Math Mini Quiz 6

This Mini Quiz, we're going to explore the math concepts that you've learned so far in this unit. This assignment should take you about **20 minutes**.

1) Each of the equations is given in one of the forms that we talked about in class (standard, factored, vertex). For each one, ***label the form*** and ***write and label the other two remaining forms***

a) $y = 2(x - 5)(x + 1)$ → *factored form*

Standard Form
$2(x^2-4x-5)$
$2x^2-8x-10$

Vertex Form
$2(x^2-4x-5)$
$2(x^2-4x + 4) + 2(-4-5)$
$2(x-2)^2-18$

b) $y = (x - 1)^2 - 4$ → *vertex from*

Standard Form
$x^2 - 2x + 1 - 4$
$x^2 - 2x - 3$

Factored Form
$x^2 - 2x - 3$
$(x - 3)(x + 1)$

c) $y = 2x^2 + x - 1$ → *standard from*

Factored Form
$(x + 1)(2x -1)$

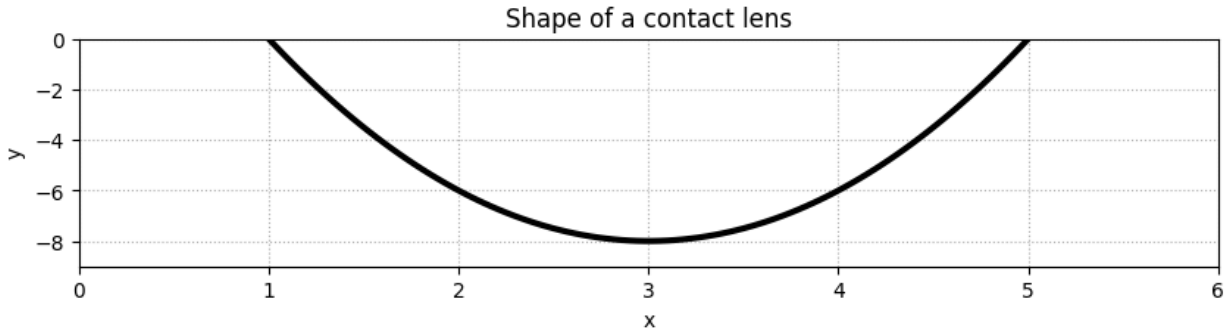
Vertex Form
$2(x^2 + x/2 - 1/2)$
$2(x^2 + x/2 + 1/16) + 2(-1/2 -1/16)$
$2(x + ¼)^2 + 2(-7/16)$
$2(x + ¼)^2 - 7/8$

(yes, there's a back, don't forget it)

*note that actually the train would slow down as it approaches, but we are simplifying this problem

2) Below you have the graph representing the shape of a contact lens[1], often considered a more convenient way of correcting vision than glasses. Its shape follows a quadratic equation (similar to the parabolic example we did in class).

Write the function *y(x)* to express the shape of the contact lens. You may write it in any form that you would like. You may need to do some work, but not a lot of work to reach your answer.



The solution can most conveniently be found with either vertex or factored form.

Factored Form:

In factored form, we know that we have the form

$$y = a(x - x_{0,1})(x - x_{0,2})$$

Where $x_{0,1}$ and $x_{0,2}$ are the zeros or x-intercepts of the graph. Here we see the x intercepts occur at 1 and 5. So, our equation looks like:

$$y = a(x - 1)(x - 5)$$

Finally, we need to find a, which we can do by plugging in any point on the graph. For example, the graph goes through $(2, -6)$, so if we plug that in:

y =a (x - 1)(x - 5)
-6 = a (2 - 1)(2 - 5) = a (1)(-3) = -3a
a = 2
So the equation becomes

$$y = 2(x - 1)(x - 5)$$

Vertex Form

In vertex form, we know that we have the form

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

Where h and k are the x and y coordinates of the vertex. Looking at the graph, we can see that the vertex occurs at (3, -8). So the equation looks like

$$y = a(x - 3) - 8$$

Be careful of the sign of h and k. Now, like with the factored form, we see that the graph goes through $(2, -6)$, so if we plug that in to solve for a:
y =a (x - 3) + 8
-6 =a (2 - 3) + 8 = -a + 8
a = 14

So the equation is

$$y = 14(x - 3) - 8$$

Notice that the a in the vertex and factored forms aren't necessarily the same

[1] Contact lens image from https://www.healthline.com/health/eye-health/how-to-put-in-contact-lenses

The end, good job :)