Math

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1 Problem 1

a in all forms purely changes the shape and direction of the parabola. c in the expanded form is the y-intercept. d in the vertex form is the x coordinate of the vertex. h in vertex form is the y coordinate of the vertex. x_1 and x_2 in the factored form represent the two x-intercepts. Increasing b moves the vertex of the parabola left while maintaining the same shape and y-intercept. Decreasing b moves the vertex of the parabola right while maintaining the same shape and y-intercept.

2 Problem 2

A quadratic does not have a factored form if its a is positive and its y-intercept is greater then 0 or if its a is negative and its y-intercept is less then 0.

3 Problem 3

x_1 and x_2 are solutions to the equation $0 = ax^2 + bx + c$, where x is x_1 and x_2 respectively, the equation $0 = a(x-d)^2 - h$, where x is x_1 and x_2 respectively and the equation $0 = a(x - x_1)(x - x_2)$.

4 Problem 4

4.1 Expanded to Vertex

a is the same in both forms. d in vertex is $\frac{b}{2a}$. h is $c - \frac{b^2}{4a^2}$.

4.2 Expanded to Factored

a is the same in both forms. x_1 and x_2 are the two solutions to $0 = ax^2+bx+c$.

4.3 Vertex to Expanded

a is the same in both forms. Evaluate $(x+d)^2$, then add d^2 to c and subtract remove the d^2 term.

4.4 Vertex to Factored

a is the same in both forms. x_1 and x_2 are the two solutions to $0 = a(x+d)^2+h$

4.5 Factored to Expanded

a is the same in both forms. Evaluate the $(x-x_1)(x-x_2)$ to find the expanded form.

4.6 Factored to Vertex

Convert to expanded form then to vertex form.

5 Problem 4

Let (x_0, y_0) be a solution to the equation $y = f(x)$. If you change the x to $x - s$, increasing x_0 by s to account for the decrease by s would also be a solution. Therefore $x_0 + s, y_0$ is a solution to $y = f(x - s)$. If you change y to $y - t$, if you added t to x_0 it would cancel out the t, therefore $(x_0, y_0 + t)$ is a solution. If we combine the two we find that $(x_0 + s, y_0 + t)$ is always a solution to $y - t = f(x - s)$ if (x_0, y_0) is a solution to $y = f(x)$. This means that if you increase s, every point moves right, and if you increase t every point moves up.