

Name: \_\_\_\_\_

Partner's Name: \_\_\_\_\_

**3.1 and 3.2 Properties of Quadratic Functions - Assignment**

1. A stone is thrown into the air from a bridge over a river. It falls into the river. The height of the stone,  $h$  meters, above the water  $t$  seconds after the stone is thrown is modelled by the equation:  $h = -3t^2 + 18t + 48$ .

a. How high is the bridge? (2 marks K)

b. What is the height of the stone after 10 seconds? (3 marks K)

- c. How long does it take the stone to hit the water?

Determine this value two ways:

Factoring (4 marks A)

The Quadratic Formula (6 marks A)

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- d. What is the maximum height reached by the stone, and when does this occur? Determine this value two ways.

Completing the Square  
(6 marks A)

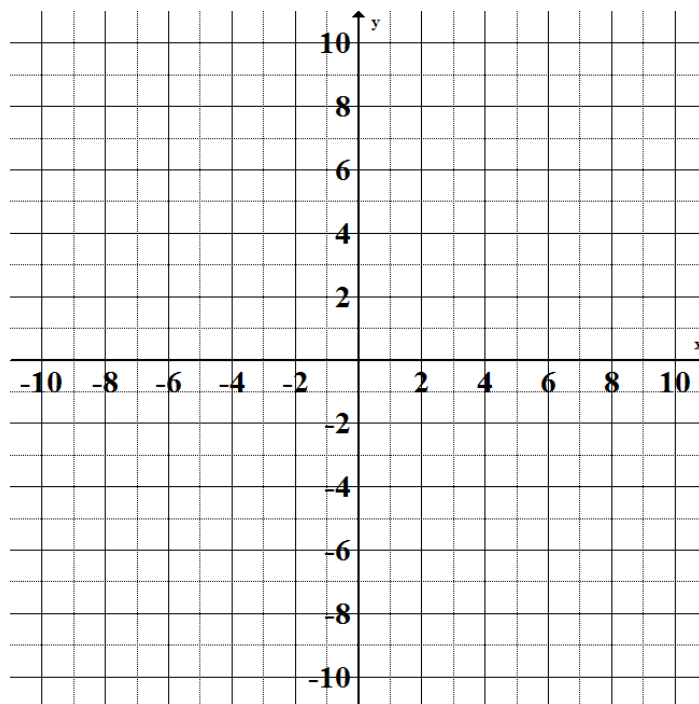
Using your Factored Form Equation from part b  
(4 marks A)

- e. Determine the domain and range of the function in this situation. (8 marks K)

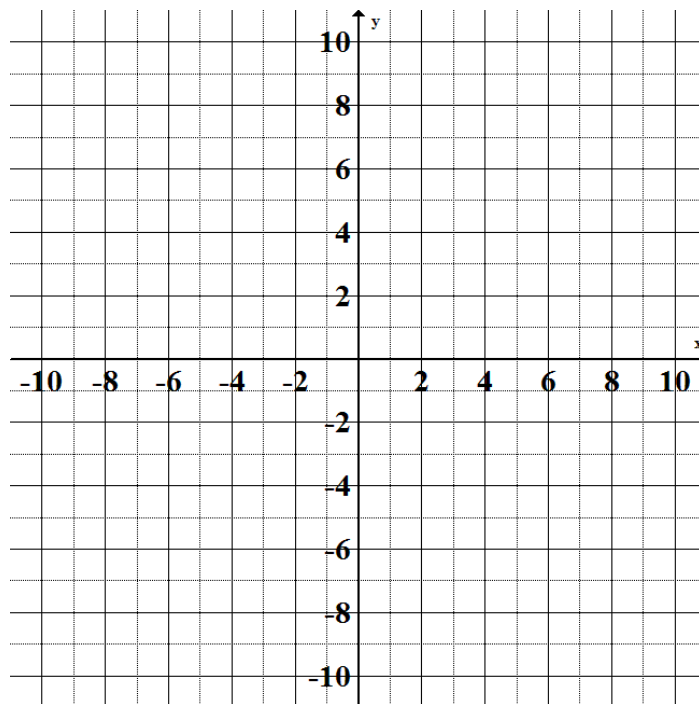
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2. Given  $f(x) = -3(x - 3)^2 + 7$ , state the vertex, axis of symmetry, direction of opening, y-intercept, step pattern, domain and range. Graph the function. Be sure to identify ALL key features. (6 marks K, 5 marks A, 6 marks C)



3. Given  $f(x) = 2(x + 1)(x - 3)$ , state the zeros, the vertex, axis of symmetry, direction of opening, y-intercept, and step pattern. Then, graph it. Be sure to identify ALL key features. (5 marks K, 5 marks A, 5 marks C)



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4. Given a function with a minimum value of  $y = -8$ , and zeros  $x = 1$  and  $x = -7$ , determine the equation of the function in all three forms (Standard, Vertex and Factored). (10 marks T)

5. Mr. Gilbert thinks he's sooo great. He has been bragging lately that he can just look at the vertex form equation of any parabola and determine if the function has one zero, no zeros or two zeros without doing any math! Explain how he does it. Be sure to include an explanation of how he determines each of the three cases and a rough sketch of each. (9 marks C)

24 K   30 A   20 T   20 C