Name:

Date:

School:

Facilitator:

**6.05 Applications of Quadratic Functions**

**A rocket is launch from the ground and the path of the rocket is modeled by the equation *h* = -4*t*2 – 80*t* where *h* represents the height of the rocket (in feet) after *t* seconds. Using the graph, answer each question.**



|  |  |
| --- | --- |
| 1. | How long does it take for the rocket to reach the ground? Be sure to include your units. |
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|  |  |  |  |
| 2. | How did you determine your answer for #1? |
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|  |  |  |  |
| 3. | What is the maximum height the rocket will reach? |
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|  |  |  |  |
| 4. | How did you determine the maximum height in #3? Be specific. |
|  |  |
|  |  |  |  |
| 5. | How many seconds will it take for the rocket to reach its maximum height? |
|  |  |
|  |  |  |  |
| 6. | How did you determine how long it would take for the rocket to reach its maximum height in #5? Be specific. |
|  |  |

**A rocket carrying fireworks is launched from a hill above a lake. The rocket will fall into the lake after exploding at its maximum height. The rocket’s height above the surface of the lake is given by the function *h* = -16*t*2 + 64*t* + 80. In this function, *h* is the height of the rocket (in feet) and *t* is the amount of time (in seconds). Use this information to answer each question.**



|  |  |
| --- | --- |
| 7. | Determine the maximum height of the rocket. Show your work. |
|  | *x* = –  |  | = |  | = |  |  |
|  |  |  |  |
|  |  |  |
|  | *h* = -16()2 + 64() + 80 |
|  | *h* = -16() +  + 80 |
|  | *h* =  +  + 80 |
|  | *h* =  |
|  |  |  |
|  | The rocket will reach its maximum height of  feet after  seconds. |
|  |  |  |

|  |  |
| --- | --- |
| 8. | Using the quadratic formula, determine how long it will take for the rocket to reach the ground. |
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|  | *x* = seconds | *x* = seconds |
|  |  |  |
|  | One of the answers above will not be a possible answer. Which answer is not possible and why? |
|  | The answer *x* =  isn’t a possible answer because . |
|  |  |  |
|  | The rocket will reach the ground after  seconds. |
|  |  |  |
|  |  |  |
| 9. | Predict the height of the rocket after 3 seconds. |
|  | **Show work here:** |  |
|  | *h* = -16()2 + 64() + 80 |  |
|  | *h* = -16() +  + 80 |  |
|  | *h* =  +  + 80 |  |
|  | *h* =  feet |  |
|  |  |  |

**Farmer Joe wants to fence in a rectangular area that has one side bordered by a stream. If he has 80 meters of fencing, what are the dimensions and the maximum area he can enclose? The area of the fenced area can be found using the formula *A* = *lw* where *l* represents the length and *w* represents the width.**



|  |  |
| --- | --- |
| 10. | Substitute in the formula and simplify to find the function to find the maximum area. |
|  | *A* = ()() |  |
|  | *A* =  |  |
|  |  |  |
| 11. | Find the value of *x* which is the value of the width. |
|  | *x* = –  |  | = |  | = |  |  |
|  |  |  |  |
|  |  |  |  |
| 12. | Substitute into 80 – 2*x* and simplify to find the value of the length. |
|  | *l* = 80 – 2() |
|  | *l* = 80 –  |
|  | *l* =  meters |
|  |  |  |  |
| 13. | Substitute *x* = 20 into the function *A* = 80*x* – 2*x*2 to find the maximum area. |
|  | *A* = 80() – 2()2  |
|  | *A* =  – 2() |
|  | *A* =  –  |
|  | *A* =  m2  |
|  |  |
|  | The conclusion is that the dimensions of the fenced area will be  meters by  meters and the maximum area of the fenced region is  square meters. |
|  |  |