

Quadratic Functions Test

Integrated Math 2

Name _____

Block: _____

You have 65 minutes. Calculators are permitted. If you use your calculator to graph something, sketch the graph and label key points to show your work. No sketch = no evidence for me of your understanding. Show all work!!!

1) Solve by factoring:

6 marks – K

a) $x^2 + 2x - 35 = 0$

b) $5x^2 + 11x - 12 = 0$

2) Solve $y = 3x^2 + 12x - 15$ by using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

4 marks – K

Then use a second method of your choosing to VERIFY that you have used the quadratic formula correctly and that your solutions to the equation are correct.

4 marks – T

Quadratic Formula

Method 2



3) How many x -intercepts can a parabola have? Explain briefly, including diagrams/graphs in your explanation.

2 marks – K

1 mark – C

4) A rock is tossed into the air from a bridge over a river. The rock's height above the water in meters, h , after t seconds is modeled by the equation $h = -5(t - 3)^2 + 60$.

a) Use an **algebraic** method to determine how high the bridge is above the water. 2 marks – A

b) Use an **algebraic** method to determine how long the rock is in the air. 4 marks – A

c) When does the rock reach its maximum height? 1 mark – A

d) What is the rock's maximum height? 1 mark – A

e) Confirm your findings from parts a-d by **graphing** the function on your calculator. Show your work by sketching the graph here and labeling the appropriate points that you found. Also label your axes. 4 marks – C

5) A manufacturer finds that the profit $\text{€}P$ from producing x bicycles per day is given by $P = -x^2 + 50x - 200$.

- a) Use an **algebraic** method to find out how many bicycles should be assembled per day in order to maximize the profit. What is the maximum profit? 4 marks – A

Answer: _____ bicycles per day should be assembled in order to achieve a max profit of _____

- b) What is the loss made if no bicycles are produced in a day? Suggest why this loss would be made. 1 mark – A
1 mark – T

6) **John** hits a golf ball that stays in the air for 4.8 seconds, and reaches a maximum height of 80 feet above the ground. (Assume that the ground is level and that the ball travels in a parabolic path).

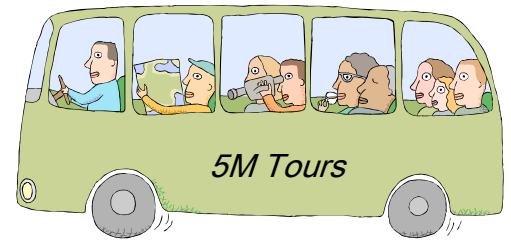
- a) Sketch a graph of the **height** of John's ball over **time**. Label the vertex and both x-intercepts with the correct coordinates. Also label your axes. 3 marks – A
2 marks – C

Susan hits a golf ball that stays in the air for 3 seconds, and reaches a maximum height of 90 feet above the ground.

- b) Write an **equation** for the height (y) of Susan's ball over time (x). Write your equation in the form $y = a(x + b)(x + c)$, given that $a = -40$. 2 marks – A

Equation: $y = -40(x \quad)(x \quad)$

- 7) I'm sure you remember Mr. Math's Magical Mathematical Mystery Tours. The company's original **profit per student** (P), is represented by the quadratic equation $P = -0.6n^2 + 36n - 405$, where n represents the number of students taking the tour.



Say the company decides to restructure and now the profit equation is $P = -0.2n^2 + 16n - 75$.

Is this a “successful” restructuring? Explain why or why not, including a graph of both equations to justify your thinking. Also include some specific numbers in your explanation.

3 marks – T
2 marks – C

- 8) How do you know by looking at the **equation** $y = 2(x-1)^2$ that the vertex is at $(1, 0)$ and that the parabola opens upward?

3 marks – C

Totals:

Application:	/18	Communication/Technology:	/14
Knowledge:	/10	Critical Thinking:	/8