NAME: _____ BLOCK: _____.

PART 1 – Calculator Active

Provide clear and concise supporting evidence for your solutions. Your evidence should be either algebraic or graphic, as is necessary and appropriate OR as is required. Incorrect answers without supporting evidence/working will NOT earn partial marks!!!

1. The population of Mr. Smith's home town is modeled by the quadratic equation $P = 14t^2 + 820t + 42{,}000$, where ***t*** is time in years since 2000 (so ***t*** = 0 represents the year 2000 and then ***t*** = 3 represents the year 2003 and t = -4 would represent the year 1996)

   a. What will be the population in 2008? BRIEFLY explain/show how you determined your answer.

   (2M)

   b. What was the population in 1991? BRIEFLY explain/show how you determined your answer.

   (2M)

   c. In which year(s) was the population 38,250? BRIEFLY explain/show how you determined your answer.

   (3M)

   d. Determine the year in which the fewest people lived in this town. BRIEFLY explain/show how you determined your answer.

   (2M)

   e. Would this model (the given quadratic equation) be a good model to use in predicting the population of the town in the year 2050? Explain your reasoning.

   (2M)

2. A toy rocket is sitting on a tower and is launched vertically upward. Mr. S records the height and time of the rocket's flight. The table below shows its height, ***h***, in meters, at ***t*** seconds after launch.

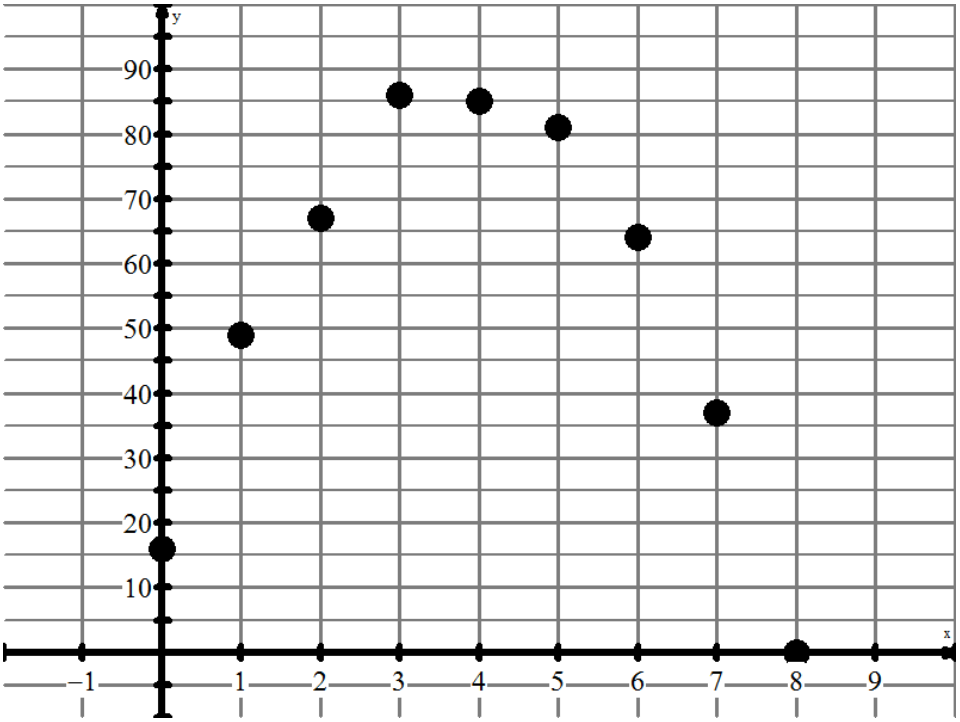
Time (s)	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Height (m)	16	49	67	86	85	81	64	37	0

a. Explain WHY Mr. Smith should use a quadratic relation to model this data.

(1M)

b. Mr. Smith has provided a scatter-plot showing the data. On this scatter-plot, draw a quadratic curve to fit the data.

(2M)



c. Judging by your curve, approximate the maximum height reached by the rocket.

(1M)

d. Judging by your curve, what are your x-intercepts (zeroes) of the curve.

(2M)

e. Using your approximated zeroes, determine a possible quadratic equation to model the data. (3)

f. Use your graphing calculator (use STAT LIST and then QUADREG) to determine the equation of the quadratic equation for this data set. Round numbers to one decimal place.

(2M)

g. According to your QUADREG equation, what is the maximum height reached by the rocket? Round numbers to one decimal place.

(2M)

h. Are your /QUADREG equation from (g) and your equation from your hand drawn curve (from (e)) similar? Yes or no and explain why/why not.

(2M)

3. You are given the quadratic equation $y = -12x^2 + 48x + 384$. You may use your graphing calculator to graph the parabola and then answer the following questions dealing with using the graphs to help us factor quadratic equations:

a. Solve the equation $0 = -12x^2 + 48x + 384$. Explain how you used the graph and/or the graphing calculator to help you solve the equation.

(3M)

b. Now, you will factor the equation $y = -12x^2 + 48x + 384$. Explain how you can use your answer to question (a) to help you factor the equation.

(2M)

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PART 2 – Calculator Inactive

Provide clear and concise supporting evidence for your solutions. Your evidence should be either algebraic or graphic/visual, as is necessary and appropriate OR as is required. Incorrect answers without supporting evidence/working will NOT earn partial marks!!!

1. Expand the following quadratic expressions:

   a. $2x(x-5)$ **(2M)**

   b. $(x+6)(3-x)$ **(3M)**

   c. $-3(x+4)^2$ **(3M)**

   d. $(3x-6)(4-5x)$ **(3M)**

2. Factor the following quadratic expressions:

   a. $7x-14x^2$ **(2M)**

   b. x^2-25 **(2M)**

   c. $x^2-9x+14$ **(2M)**

   d. $6x^2+5x-4$ **(3M)**

3. Solve the following quadratic equations:

a. $x(x-2)=0$

(2M)

b. $x^2+4x-21=0$

(3M)

c. $2x^2+10x=-12$

(4M)

d. $3x^2+3x=5+17x$

(4M)

4. A parabola has a vertex at (-5,10) and it has a zero x = 2. Where is the second zero?

(2M)

5. Youssef thinks he knows that the quadratic function $y=-2(x+1)(2-x)$ has a minimum value. Explain how he knows that this is TRUE OR explain why you think that he is WRONG!

(2M)

6. Here is some information about a parabola, whose equation in factored form is $y = a(x - R)(x - S)$. The points (-4,0) and (7,0) lie on the curve of this parabola, as does the point (4,48).

   a. Determine the equation of the axis of symmetry of the parabola.

(1M)

   b. Sketch a graph, so you can visualize the information provided above.

(3M)

   c. Determine the equation of the parabola. Write the equation in factored form.

(3M)

   d. Write the equation in standard form.

(2M)

   e. Use your equation to solve for the value(s) of x that give y = -24. BRIEFLY, explain the meaning of your solution.

(4M)

7. Mr. S is standing on top of a building and throws a ball upward and forward to Mr Smith, who is standing on the ground. The height of the ball above the ground is modeled by the quadratic equation $h = 105 + 20t - 5t^2$, where ***h*** represents height, in meters, above the ground and ***t*** represents the time in seconds since Mr. S released the ball.

   You could make a sketch to visualize the information provided

   f. How high is the building?

   (1M)

   g. What is the maximum height of the ball?

   (3M)

   h. At what time(s) is the ball 105 m above the ground?

   (3M)

   i. Determine the zeroes and explain what they mean in the context of this question.

   (3M)

   j. For how long is the ball in flight?

   (1M)