1. Answer the following question, which deal with general properties of quadratics.

   a. Solve the quadratic equation $0=(x+2)^2-9$ **(K2)**

   b. Fully factor the quadratic expression $3x^2+15x+18$ **(K2)**

   c. Determine the equation of the axis of symmetry of $f(x)=-3(x+4)(x-9)$ **(K2)**

   d. State the range of the quadratic function $f(x)=-\frac{1}{2}(x-4)^2+8$ **(T2)**

   e. Mr. S. knows that the quadratic function $f(x)=3(x+5)^2+4$ has NO x-intercepts. EXPLAIN how he knows that this is true. **(T1)**

   f. Mr. S. knows that the quadratic function $f(x)=\frac{1}{2}(x+1)(2-x)$ has a maximum value. EXPLAIN how he knows that this is true. **(T1)**

2. Given the quadratic function $g(x) = 3x^2 + 6x - 45$. Answer the following questions wherein all work must be ALGBERAICALLY supported in order to possibly earn full credit for each question.

   a. Determine the y-intercept.

   (K1)

   b. Factor to find the zeroes of the parabola.

   (K2)

   c. Determine the co-ordinates of the vertex.

   (K2)

   d. Determine the co-ordinates of any other point on the parabola.

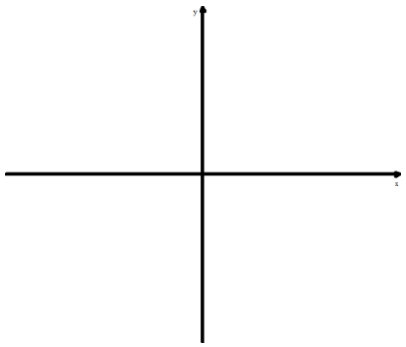
   (K2)

   e. Write the equation of this parabola in vertex form.

   (T2)

   f. Sketch the parabola on the grid provided, labeling the key features you determined in the previous questions.

   (C4)



3. When Mr. Santowski hits a baseball, its height, h, in meters, after t seconds since being hit is modelled by $h(t) = -5(t-4)^2 + 81.3$ where *h* is the height of the ball, in meters, *t* seconds after the ball was hit. For this question, you are expected to present **algebraic** solutions in order to potentially earn full marks for your solutions.

   a. What is the height of the ball at the instant the ball is hit?

   (A2)

   b. Find the maximum height of the ball and the time when this height is reached.

   (A2)

   c. Determine the height of the ball at 7.5 seconds. Can Mr. S. catch the ball after its been in the air for 7.5s?

   (A2)

   d. Determine the value(s) of the zeroes and interpret their meaning.

   (A2,C1)

4. The quadratic function $T(m) = 2m^2 - 10m - 28$ models the monthly temperatures of a scientific research station in Siberia, Russia, where *T* is the average daily temperature in °C and *m* is the month of the year. In this model, *m* = 0 represents the beginning of January and so *m* = 5.5 would represent the middle of May.

   a. Use any suitable algebraic method to find the minimum value of *T*(*m*).

   (A4, C1)

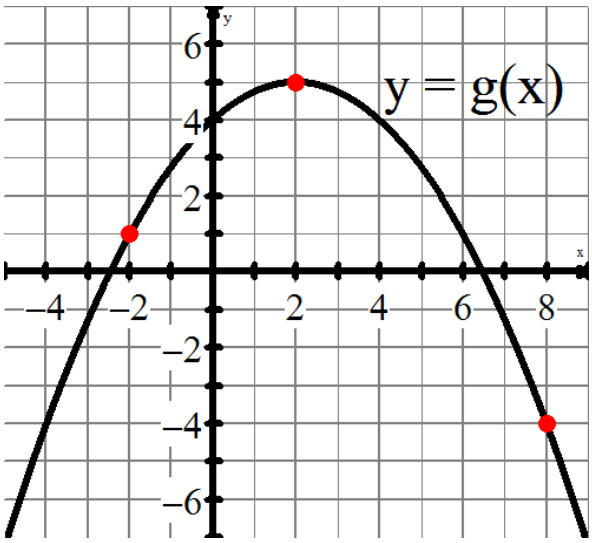
   b. In order to VERIFY that your answer in Q(a) is correct, use ANOTHER algebraic method to find the minimum value.

   (T2,C1)

   c. Use any suitable method in order to determine *T*(7.5) and then interpret the meaning of *T*(7.5).

   (A2)

5. Answer the following about the given function of g(x) which is graphed on the grid below:



a. State the maximum value.

(K1)

b. State the maximum point.

(K1)

c. Determine the equation of g(x) in vertex form.

(A3)

d. Express the equation in standard form.

(K2)

e. Algebraically, determine the values of the zeroes, correct to 2 decimal places.

(K3)

f. Briefly explain how the parent function $y = x^2$ was transformed so that its equation is now g(x).

(A2)

6. A company prints and sells math textbooks. Their revenues are modelled by the quadratic equation $R = -0.1b^2 + 16b - 100$, where ***R*** is revenue in tens of thousands of dollars for the sale and printing of ***b*** thousands of textbooks. The expenses for printing and selling the ***b*** thousands of textbooks (***E***, in tens of thousands of dollars) are given by the linear equation $E = 120 + 2b$. This question can be modelled by the system defined by $\begin{cases} R(b) = -0.1b^2 + 16b - 100 \\ E(b) = 120 + 2b \end{cases}$.

   a. EXPLAIN what it means to SOLVE A SYSTEM.

   (C1)

   b. Now, solve the system using the method of your choice. Be sure to clearly communicate your solution, whether it be using algebraic or graphic representations.

   (K3,C1)

   c. Interpret your answer in the context of the question.

   (A2)

   d. How many books must the company sell if they wish to maximize their profits? Show the analysis that leads to your conclusion.

   (T2)

TEST SCORES:

Application (A)	Communication (C)	Knowledge (K)	Thinking/PS (T)	Overall Score
/21	/9	/23	/10	

7. BONUS: $2x + b = x^2 - 2x + 5$ ➔ find the value of b such that the functions have at least one intersect ion point