Algebra C - Benchmark Quiz 3

By completing this Benchmark, you will provide evidence of your learning for the following outcomes.

	Meeting Standards	Exceeding Standards
3) Intro to Quadratic Revenue Functions	**(3A)** I understand the concept of bulk discount rate and can use it to determine the unit price of a product being purchased/sold in bulk: $Bulk\ Price = Base\ Price - (Disc.\ Rate)(x)$ **(3B)** I can model revenue from a bulk sale by creating a function of the form: $R(x) = (Bulk\ Price)(x) = (b - dx)(x)$ **(3C)** I can evaluate quadratic revenue functions and identify their important features graphically: vertex, intercepts, axis of symmetry. (Further, I can interpret the meaning of these points in a real-world context.) **(3D)** I can use the formula $\frac{b}{2d} = \frac{b}{d} \times \frac{1}{2}$ to identify the point at which a bulk sale maximizes revenue. (Note: this is a special case of the generalized axis of symmetry formula. It can be interpreted as the point in production/sale where the discount amounts to being half of the based price. Pretty cool).	___ I can rewrite a quadratic function in multiple, equivalent forms. ___ I can understand/derive the axis of symmetry formula geometrically, thinking of it as the midpoint between x-intercepts.
4) Creating and Analyzing Linear-Quadratic Systems to Maximize Profit	**(4A)** Given a business product, I can create a linear cost function and a quadratic revenue function to model a real-world path from manufacturer → consumer. **(4B)** I can graph a linear-quadratic system of cost and revenue functions for the purpose of analysis.(I can visualize profit as the distance (pos or neg!) between revenue and cost functions. I can interpret the intersection point where R(x)=C(x) as the "break-even" point) **(4C)** Given a graph comparing cost and profit functions, I can plot new points $(x\ ,\ R(x) - C(x))$ to represent a (quadratic!) profit function. **(4D)** I can make recommendations for production levels of a business to maximize profit.	___ I can create a *new* quadratic profit function by taking the difference of revenue and cost functions: (i.e. I can use the distributive property and combine variable terms) $P(x) = R(x) - C(x)$ __ I can identify the maximum of a profit function by identifying its vertex algebraically.

Page 1: Understanding a Bulk Sale Revenue Function

Angela is deciding to expand her business by selling her product to retail stores.

She started her business by selling hair care package sets using a personal website.

Originally, she sold packages for $40 each.

Now, she is being offered a bulk sale contract by Sephora.

Sephora offers to buy Angela's hair care packages using a base price and a discount rate per package. The function below represents their offer for purchasing *x* hair care packages.

[redacted]

SEPHORA

[redacted]

$$R(x) = (28 - .02x)(x)$$

1) What does this function tell about Sephora's bulk sale offer?

(In your answer, you must use the follow vocabualary: base price, discount rate)

2) Angela is doing some calculations using this function. Her work is shown below:

$$\begin{aligned} R(x) &= (28 - .02x)(x) \\ R(150) &= (28 - .02 * 150)(150) \\ &= (\$25)(150) \\ &= \$3750 \end{aligned}$$

Complete the sentences below by moving/matching the three boxes below

the total revenue of the sale	the discount sale price per package	the number packages Angela is selling

a.) The number 150 that Angela substituted into the function represents _____

b.) The number 25 represents _____

c.) The number 3750 represents _____

Page 2: Creating and Evaluating a Bulk Sale Revenue Function

Donte's new line of designer hats is getting popular.

VIMs offers to buy his hats in bulk at a base price of $45 ,

with a discount rate of 10 cents per hat in the bulk order

3) Create a bulk sale revenue function to represent the VIMs offer.

VIM

$$R(x) = (\underbrace{\square - \square x}_{\text{bulk discount price formula}})(x)$$

4) Complete the table by calculating the revenue for selling different amounts of hats in a bulk sale.

(To receive credit, show your calculations--not just your answers)

x Number of hats in the bulk sale	R(x) the amount of revenue collected
75	
100	
200	
300	

When you finish, click on THIS LINK **. Use the graph shown to answer questions 5) and 6)**

Mattie is selling holiday sweaters she designed in bulk to Target Stores.

Her revenue for selling x sweaters can be represented by the function below:

$$R(x) = (20 - .04x)(x)$$

7) Based on this function, identify the base price and discount rate of target's offer.

"The base price target is offering is **B =** ____ *"*

"The discount rate per sweater sold is **d =** ____ *"*

8) Use the formula $\frac{B}{d} \times \frac{1}{2}$ **to determine the amount of sweaters that will maximize revenue.**

9) Calculate the maximum revenue that Mattie can collect selling sweaters to Target.