

1. A company is producing three types of food in closed cylindrical cans with the dimensions given in the table below. Fill in the blanks in the table.

Type	Radius (in)	Height (in)	Volume (in ³)	Surface Area (in ²)
Chicken Noodle Soup 	1.37	3.68		43.47
Condensed Milk 	1.50	3.07	21.70	
Almonds 	1.63	2.60	21.70	43.32

The company wants to redesign their cans to minimize the amount of aluminum needed. The cans will still need to hold 12 oz each. Use that 12 oz is approximately 21.7 in³.

- (a) Write the surface area A of a can as a function of the radius r .

- (b) What is the domain of this function?

(c) Minimize this function. Justify your answer.

(d) What does your answer to part (c) mean in the context of the problem?

(e) What are the dimensions of the can the company should make?

2. League of Legends is a multiplayer online video game. One aspect of the game involves battling other players. A player's *Effective Health* when defending against physical damage is given by

$$E = h + \frac{ha}{100},$$

where h is an indicator of the player's *Health* and a is an indicator of the player's *Armor*. Players can purchase more Health and Armor with gold coins. Health costs 2.5 coins per unit and Armor costs 18 coins per unit. Assume a player has 2669 gold coins. What is the maximum Effective Health the player can achieve?

- (a) Assume the player will spend all of their coins. Write the equation for the player's Effective Health in terms of Health h . Do NOT round any decimals!

- (b) What is the domain of this function?

(c) Maximize this function. Do NOT round any decimals! Justify your answer.

(d) Assume that players cannot buy partial units of health. Is the this maximum actually achievable? Explain.

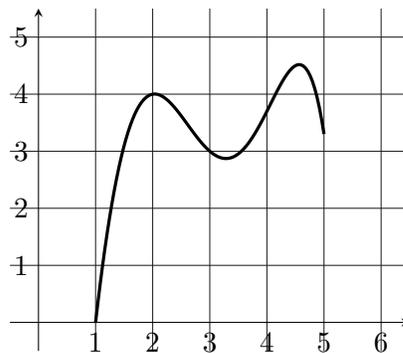
(e) What is the maximum Effective Health this player can achieve? Explain.

Names: _____

Exit Ticket

1. Describe the difference between a continuous function and a discrete function. Graph examples of each.

2. A student would like to maximize a discrete function f that is only defined on $x = 1, 2, 3, 4, 5$. They found that f can be modeled by a continuous function g . That is, $f(a) = g(a)$ when $a = 1, 2, 3, 4, 5$. Below is the graph of g .



If the student wants to find the absolute maximum value of f , is it enough to find the absolute maximum value of g ? Explain.

3. Describe how one could find the absolute maximum of a discrete function f that is modeled by a continuous function g .