

Advanced Techniques

6.2A – More Maximizing Applications

The relationship between the total sales in millions of dollars, S , and the tax rate, r , is given by each formula. (Write your answer from part a. and b. into one sentence.)

- a. Find the tax rate that maximizes the government revenue from sales tax.
- b. Find the maximum revenue.

#1) $S(t) = 5 - 9\sqrt[3]{t}$

Sentence answer:

#2) $S(t) = 10 - 21\sqrt[3]{t}$

Sentence answer:

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Marshmallow Fence

#3) George has 1200 marshmallows to build a fence around his Hello Kitty collection. He wishes to build two identical rectangular enclosures that share a common side. What should the dimensions of each marshmallow enclosure be in order to maximize the area?

What is the maximum area?

Sentence answer:

Bear Trap

#4) George wants to make a bear trap to catch squirrels. According to Reddit, he needs to dig a rectangular hole with square base with an exact volume of 4 cubic feet. Find the dimensions of the hole that can be made with the smallest dirt surface area. (Hint, the dirt surface area is the bottom and the four lateral sides of the hole. There is no dirt top of the hole. /hint)

What is smallest amount of material?

Sentence answer:

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Bob – the Sponge

#5) George needs to make an open-top aquarium with square base. The volume must be precisely 108 cubic feet to accommodate his pet sponge, Bob. Find the dimensions of the aquarium that can be made with the smallest amount of material.

What is smallest amount of material?

Sentence answer:

Bunny Farm

#6) Wanting to start a bunny rabbit farm, George wants to build the rectangular enclosure using celery and carrot sticks as fencing with the enclosure being exactly 800 square feet. The fencing closest to his house is to be made of carrot sticks and costs \$6 per foot; however, the other three sides consists of celery sticks costing only \$2 per foot.

Find the dimensions that will minimize the cost.

What is the minimum cost?

Sentence answer:

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Carrots & Celery

#7) George wants to build a carrot and celery garden enclosed by a fence made of bunnies and rabbits. The garden is to be 5000 square feet. If the fence along the front is made from bunnies and costs \$6 per foot but on the other three sides is made of rabbits and costs only \$2 per foot, find the dimensions that will minimize the cost.

What is the minimum cost?

Sentence answer:

Cookies for Friends

#8) George estimates that by giving away cookies for x days, he will gain $2x$ friends, but his cookie expenses will be $5x^2 + 500$ dollars. He wants to give away cookies the number of days that maximizes the number of friends per dollar, $f(x) = \frac{2x}{5x^2+500}$ dollars. For how many days should he give away cookies?

How many friends did he gain per dollar?

Sentence answer: