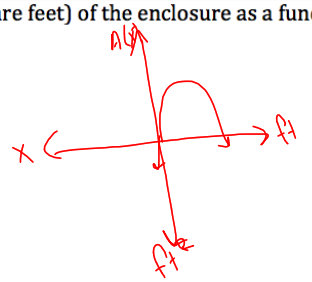
10.4 Modeling with Quadratics

PRACTICE

Directions: Use the given information to answer the questions. Whenever needed round to the HUNDREDTHS place. Sketch the situation.

Mr. Kelly is building a pen for his dog Tasker in his backyard. The area (in square feet) of the enclosure as a function of one side of the pen is modeled by: $A(x) = 40x - x^2$.



1) What is the maximum area of Tasker's pen?

400 ft^2

2) What is the length of one side to achieve the maximum area?

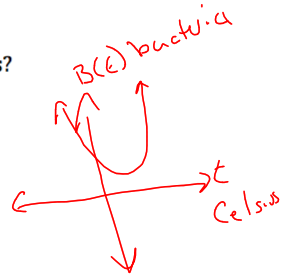
20 ft

3) At what length would the pen have no area?

A(x) = 0

x = 0 ft and 40 ft.

The number of bacteria in refridgerated as a function of the temperature of the food in Celsius is modeled by the function: $B(t) = 20t^2 - 20t + 120$.



4) How many bacteria were there in the food when the temperature was 10 degrees Celsius?

t = 10

1920 bacteria

5) At what temperature will there be no bacteria in the food?

There will always be some bacteria.

6) What is the minimum amount of bacteria that will be in the food?

115 bacteria

7) What is the temperature that the minimum amount of bacteria will occur?

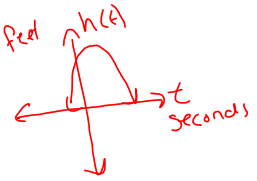
0.5° Celsius

8) At what temperature will there be 200 bacteria present in the food?

B(t) = 200

2.56° Celsius

Mr. Brust throws his manpri's out the window in frustration. The height (in feet) of the manpris as a function of time (in seconds) is modeled by the function: $h(t) = -16t^2 + 64t + 190$



9) How long will it take Mr. Brust's manpri's to reach their maximum height?

2 seconds

10) What is the maximum height the manpris will reach?

254 feet

11) What is the height that Mr. Brust was at when he threw his manpris?

t = 0, y-intercept

190 feet

12) When will the manpris hit the ground?

x-intercept h(t) = 0

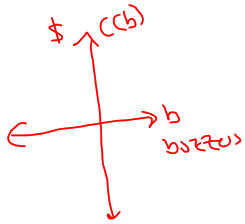
3.98 seconds

13) How long will it take for the manpris to be 200 feet off the ground

h(t) = 200

0.16 seconds AND 3.84 seconds

Mr. Bean gives up making Algebra books and decides instead to focus on manufacturing buzzers to shock you while driving. He calculates that the cost to manufacture these buzzers as a function of the number of buzzers sold can be modeled by $C(b) = 0.45b^2 - 36b + 1000$.



14) How much cost does Mr. Bean start with before he produces even one buzzer?

y-int / b=0 $1000

15) How many buzzers does he need to produce if he wants to have his costs be $2000?

C(b) = 2000 101.82 buzzers or 102 buzzers

16) What is the minimum cost of production?

$2260

17) How many buzzers would he need to produce to keep his costs at a minimum?

40 buzzers.

Solve the equation.	Solve the inequality.	Solve for y.
18) $-(8+7x) - 8(1+x) = 74$ $-8-7x-8-8x=74$ $-15x-16=74$ $+16 \quad +16$ $\frac{-15x}{-15} = \frac{90}{-15}$ $x = -6$	19) $-5(1-2n) \geq -17+8n$ $-5+10n \geq -17+8n$ $-8n \quad -8n$ $\frac{-5+2n}{2} \geq \frac{-17}{2}$ $+5 \quad +5$ $\frac{2n}{2} \geq \frac{-12}{2}$ $n \geq -6$	20) $2x + 3y = 12$ $-2x \quad -2x$ $\frac{3y}{3} = \frac{12-2x}{3}$ $y = 4 - \frac{2}{3}x$

Use the piecewise function to evaluate the following.	Factor
21) $f(x) = \begin{cases} 4x^2 - 1, & x \leq -2 \\ -x, & x > -2 \end{cases}$ a) $f(0) = -(0) = 0$ b) $f(-2) = 4(-2)^2 - 1$ $4(4) - 1$ $16 - 1 = 15$ c) $f(-3) = 4(-3)^2 - 1$ $4(9) - 1$ $36 - 1 = 35$ d) $f(2) = -2$	22) $6x^2 + 17x + 12$ 72 $8 \quad 9$ $+17$ $(6x^2+8x)+(9x+12)$ $2x(3x+4)+3(3x+4)$ $(3x+4)(2x+3)$