October 28, 2026

National Chocolate Day

Today in History:

Gateway Arch Completed (1965)

Statue of Liberty dedicated (1886)

Number of the Day: 744

744 = 2 x 2 x 2 x 3 x 31

744 is the number of perfect squared rectangles of order 14

Fun Fact:

It is Texas law that when two train meet at a railroad crossing, each shall come to a full stop, and neither shall proceed until the other has gone.

Quote of the Day:

"If I were giving a young man advice as to how he might succeed in life, I would say to him, pick out a good father and mother, and begin life in Ohio."

- Wilbur Wright

Today's Weather:

Mainly sunny, warm, high 71°

Math 121 - Quiz #31

Sketch a graph of $f(x)$ if:

Vertical asymptotes of $x = -2$ and $x = 2$

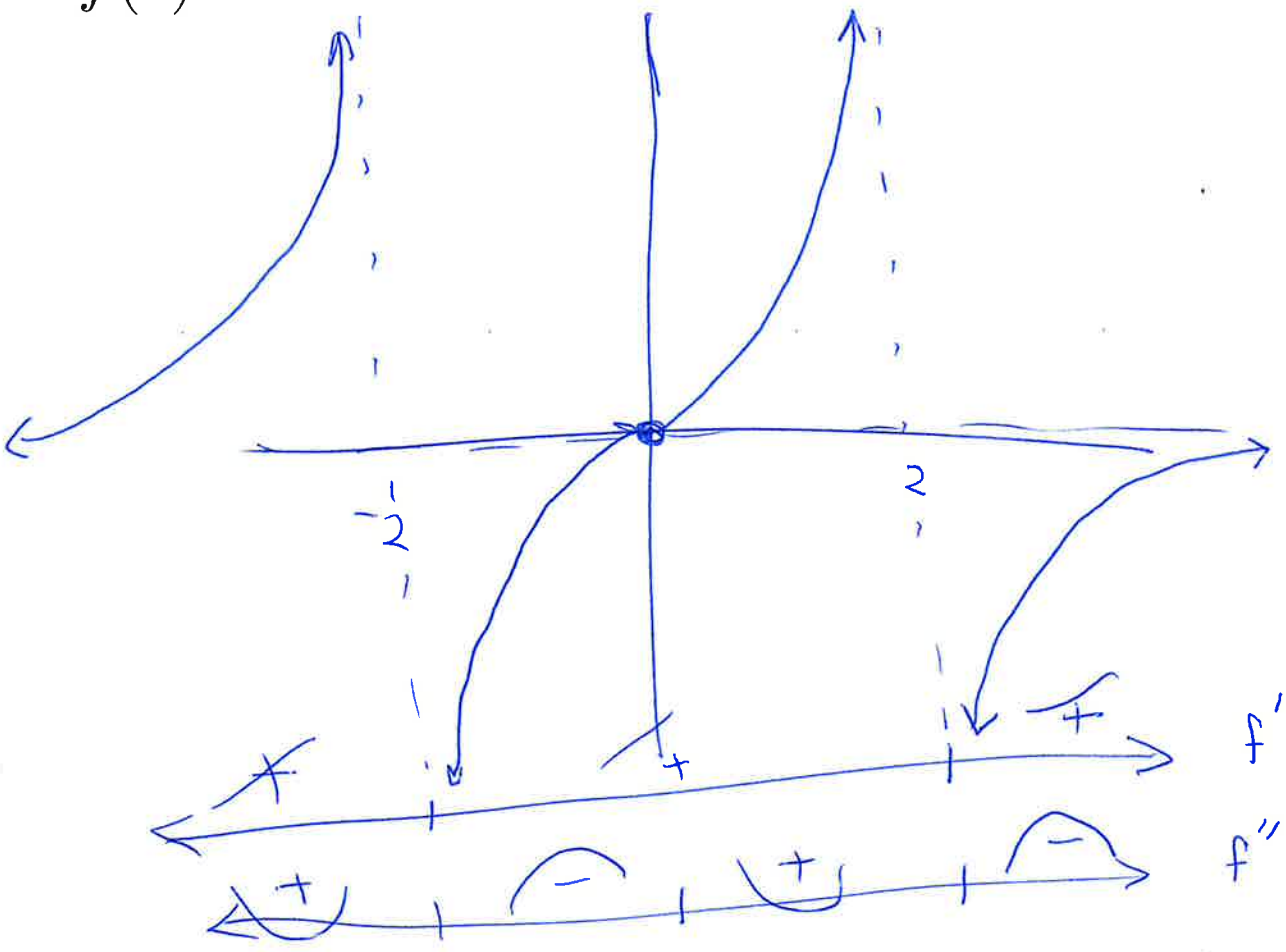
Horizontal asymptote of $y = 0$

$f'(x) > 0$ for $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$

$f''(x) > 0$ for $(-\infty, -2) \cup (0, 2)$

$f''(x) < 0$ for $(-2, 0) \cup (2, \infty)$

$f(0) = 0$



Chris's 5 Easy Step Method for Max/ Min Problems:

1. Read the Problem

2. Draw a Picture

3. Write an Equation

4. Make equation have only one variable

5. Differentiate

6. Find Critical Points and End Points

7. Find Max or Min

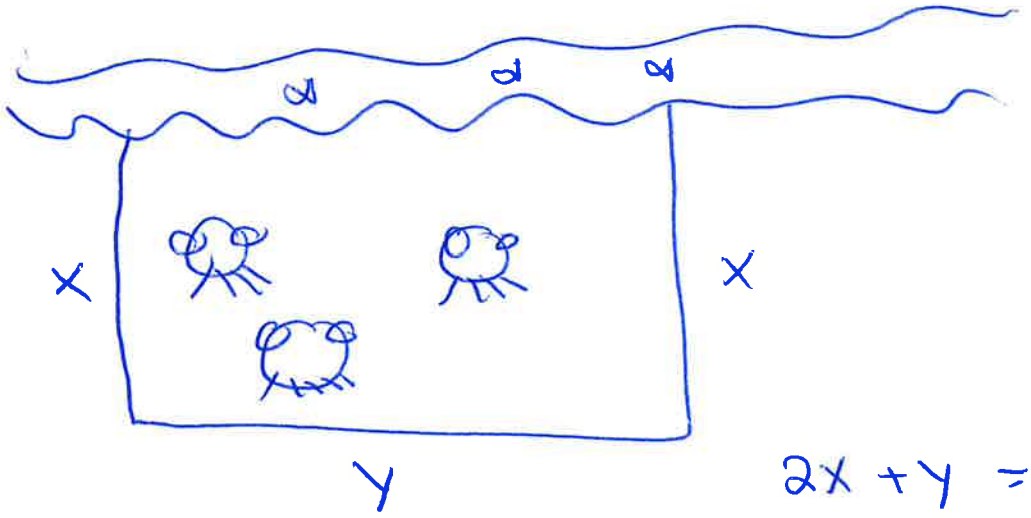
8. Answer the Question

A farmer with 4000 meters of available fencing wishes to enclose a rectangular plot that borders on a straight river. If the farmer does not fence the side along the river, what is the largest area that can be enclosed?

EXAMPLE 1

4000 m OF FENCE

LARGEST AREA.



$2X + Y = 4000$

$Y = 4000 - 2X$

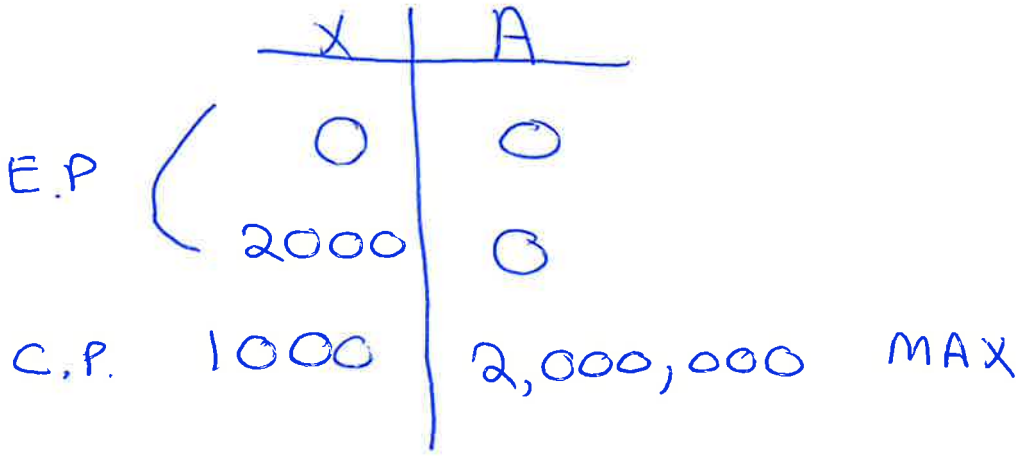
$A = XY$

$A = X(4000 - 2X) = 4000X - 2X^2$

$\frac{dA}{dX} = 4000 - 4X = 0$

$X = 1000$

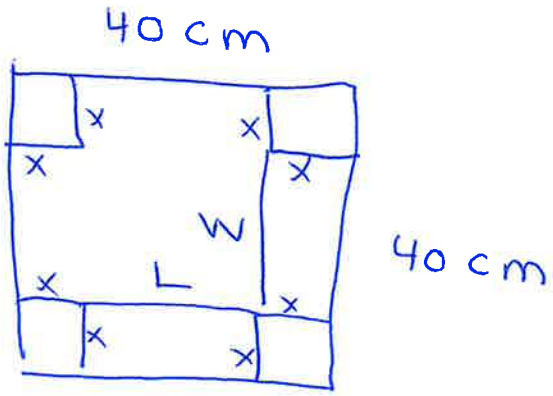
END POINTS $X = 0,\ 2000$

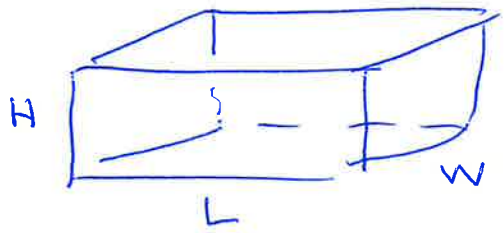


LARGEST AREA IS

$2,000,000\ m^2$

A box, open at the top, is to be made from a square piece of cardboard by cutting a square out of each corner and turning up the sides. Given that the cardboard measures 40 cm on a side, find the dimensions of the box that will give the maximum volume. What is the maximum volume?





$V = L \cdot W \cdot H$

$H = x \qquad L = 40 - 2x$

$W = 40 - 2x$

$$V = x(40-2x)^2$$

$$\frac{dV}{dx} = x\,2(40-2x)(-2) + (40-2x)^2$$

$$= -4x(40-2x) + (40-2x)^2$$

$$= (-4x + 40 - 2x)(40-2x)$$

$$= (40-6x)(40-2x)$$

$$(40-6x)(40-2x) = 0$$

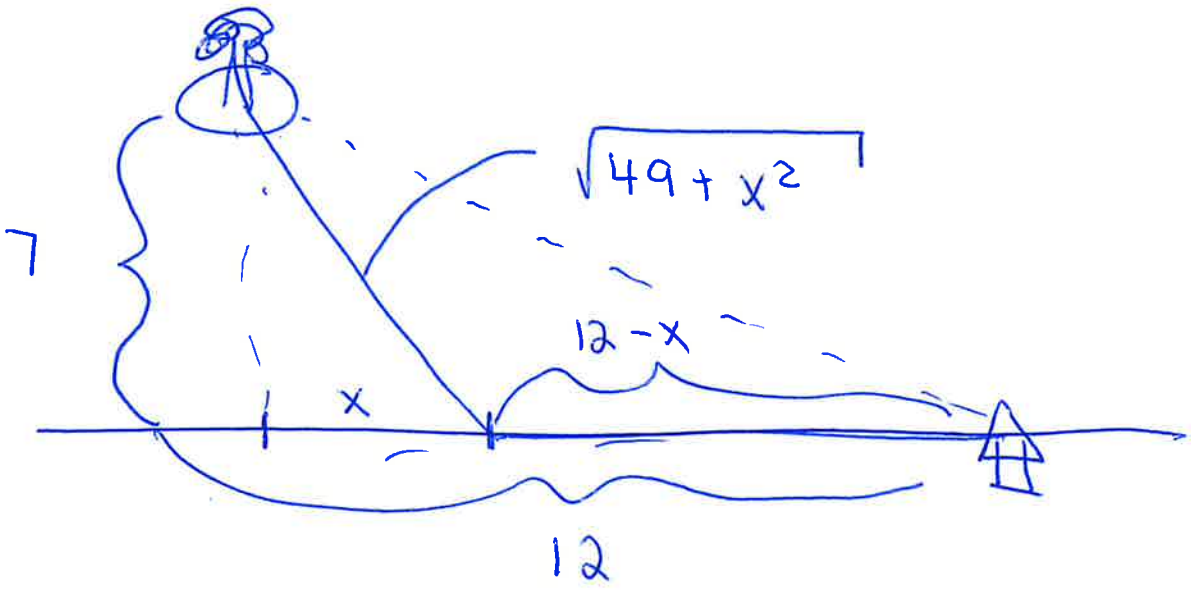
$40-6x=0$ $\qquad$ $40-2x=0$

CP. $\quad x = \frac{40}{6} = \frac{20}{3}$ $\qquad$ $x = 20$

EP $\quad x = 0, 20$

x	V	
0	0	
20	0	
$\frac{20}{3}$	$\frac{20}{3}\left(40-\frac{20}{3}\right)^2$	MAX

A telephone wire is to be laid to an island seven miles off shore at cost of $2,000 per mile along the shore and $3,000 per mile under the sea. If the telephone station is 12 miles further up the shore, how should the project be planed to minimize costs?



$$C = C_W + C_L$$

$$= 3000\, D_W + 2000\, D_L$$

$$= (3000)\sqrt{49+x^2} + 2000(12-x)$$

$$\frac{dC}{dx} = 3000\left(\frac{1}{2}(49+x^2)^{-\frac{1}{2}}(2x)\right) - 2000$$

$$= \frac{3000x}{\sqrt{49+x^2}} - 2000$$

$$3000x = 2000\sqrt{49+x^2}$$

$$9x^2 = 4(49+x^2)$$

$$9x^2 = 196 + 4x^2$$

$$5x^2 = 196$$

$$x^2 = \frac{196}{5}$$

C.P $\quad x = \pm\sqrt{\frac{196}{5}}$

EP

$x = 0, 12$

x	C
0	
12	
$\sqrt{\frac{196}{5}}$	MIN.