Grab a Calculator

p.166 #3 - 8 Due Today

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3a. $\{x|x<-2 \text{ or } x>2\}$
b. $\{x|\ -2 \leq x \leq 2\}$

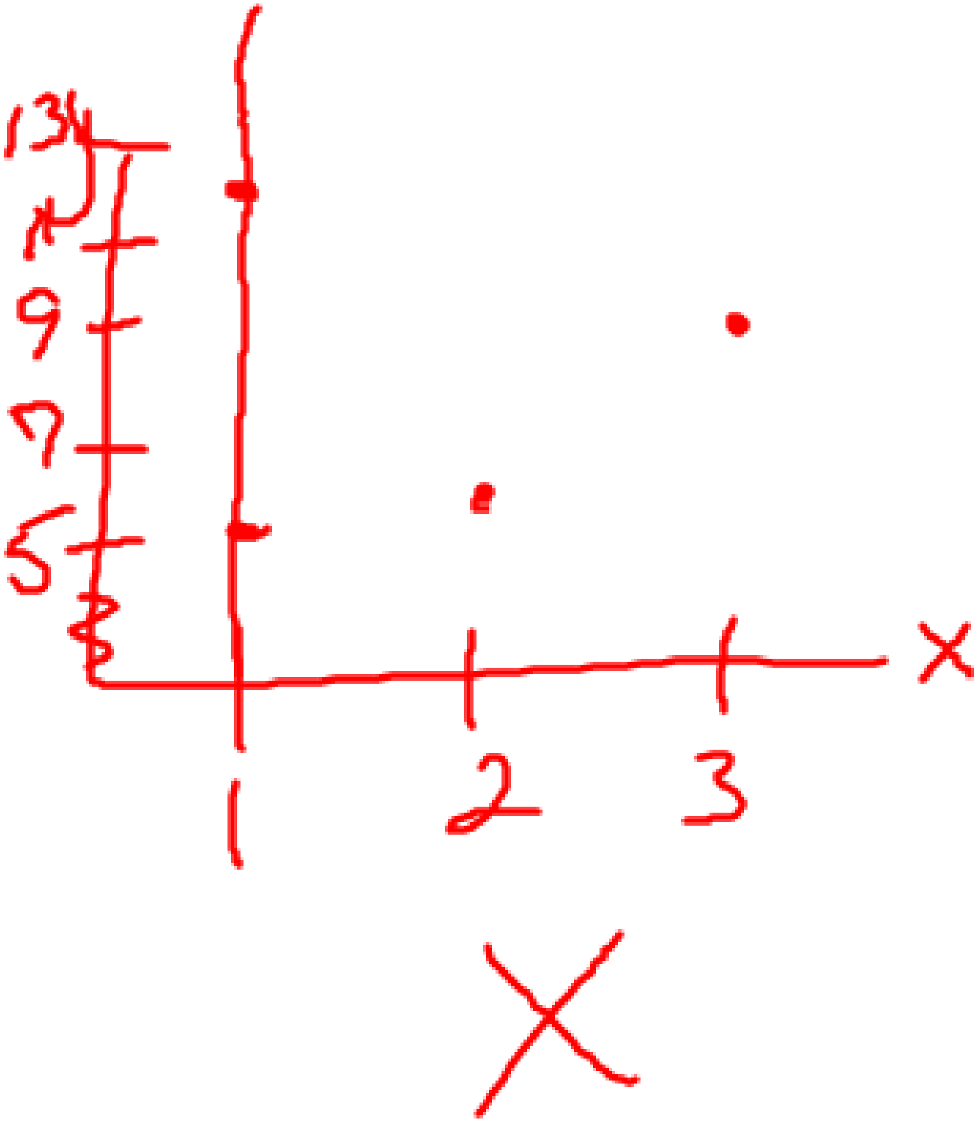
4a. $\{x|x< -1 \text{ or } x >4\}$
b. $\{x|\ -1 \leq x \leq 4\}$

5a. $\{x|-2 \leq x \leq 1\}$
b. $\{x|\ x<-2 \text{ or } x>1\}$

6a. $\{x|x<-3 \text{ or } x>1\}$
b. $\{x|\ -3 \leq x \leq 1\}$

7. $\{x|\ -2 \leq x \leq 5\}$

8. $\{x|x<-5 \text{ or } x>2\}$



$(1,4)\ (3,8)$

$y = mx + b$

$$\frac{8-4}{3-1} = \frac{4}{2} = 2$$

$$4 = 2(1) + b$$

$$4 = 2 + b$$

$$b = 2$$

$$\boxed{y = 2x + 2}$$

$$-\frac{20}{5} = \frac{Y}{X} = \frac{\text{cal}}{\text{weight}}$$

SECTIONS 3.4A

<u>BUILDING QUADRATIC MODELS FROM DATA (SCATTER PLOTS)</u>

OBJECTIVE 1

1 Build Quadratic Models from Verbal Descriptions

EXAMPLE Maximizing Revenue

The marketing department at Texas Instruments has found that, when certain calculators are sold at a price of p dollars per unit, the revenue R (in dollars) as a function of the price p is

21000 − 150p

calcators sold $x = \cancel{26,000 - 160p}$

Revenue is equal to the selling price, p, times the number of items sold, x.... R = x(p)

(a) Find a model that expresses the revenue R as a function of the price p.

$$R = x(p)$$

$$R(p) = (21000 - 150p)p$$

$$= 21000p - 150p^2$$

$$\boxed{R(p) = -150p^2 + 21000p}$$

EXAMPLE Maximizing Revenue

The marketing department at Texas Instruments has found that, when certain calculators are sold at a price of p dollars per unit, the revenue R (in dollars) as a function of the price p is

$$\cancel{x = 26{,}000 - 160p}$$

(b) What is the domain of R? hint: price = x values, calculators sold= y values

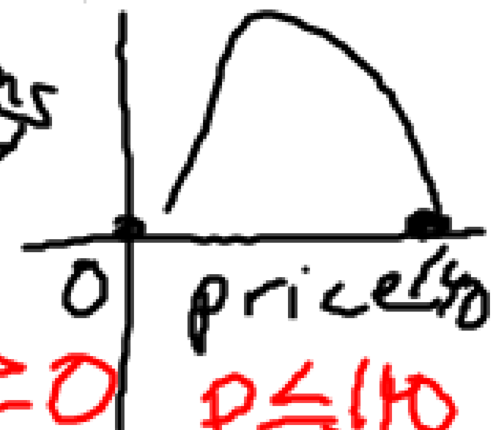
$$x = 21000 - 150p$$

items sold

$$0 = 21000 - 150p$$

$$-21000 = -150p$$

$$p = 140$$



$p \geq 0$ $p \leq 140$

(c) What unit price should be used to $\boxed{\text{maximize}}$ revenue? hint: R is a parabola

$$\frac{-b}{2a} = \frac{-21000}{2(-150)} = \frac{-21000}{-300} = \$70$$

EXAMPLE **Maximizing Revenue**

The marketing department at Texas Instruments has found that, when certain calculators are sold at a price of p dollars per unit, the revenue R (in dollars) as a function of the price p is

$$x = 26{,}000 - 160p$$

(d) If this price is charged, what is the maximum revenue?

$$R(p) = -150p^2 + 21000p$$

$$R(70) = -150(70)^2 + 21000(70)$$

$$\boxed{= 735{,}000}$$

(e) How many $\boxed{\text{units are sold}}$ at this price? hint: x is calculators sold.

$$x = 21000 - 150p$$

$$x = 21000 - 150(70)$$

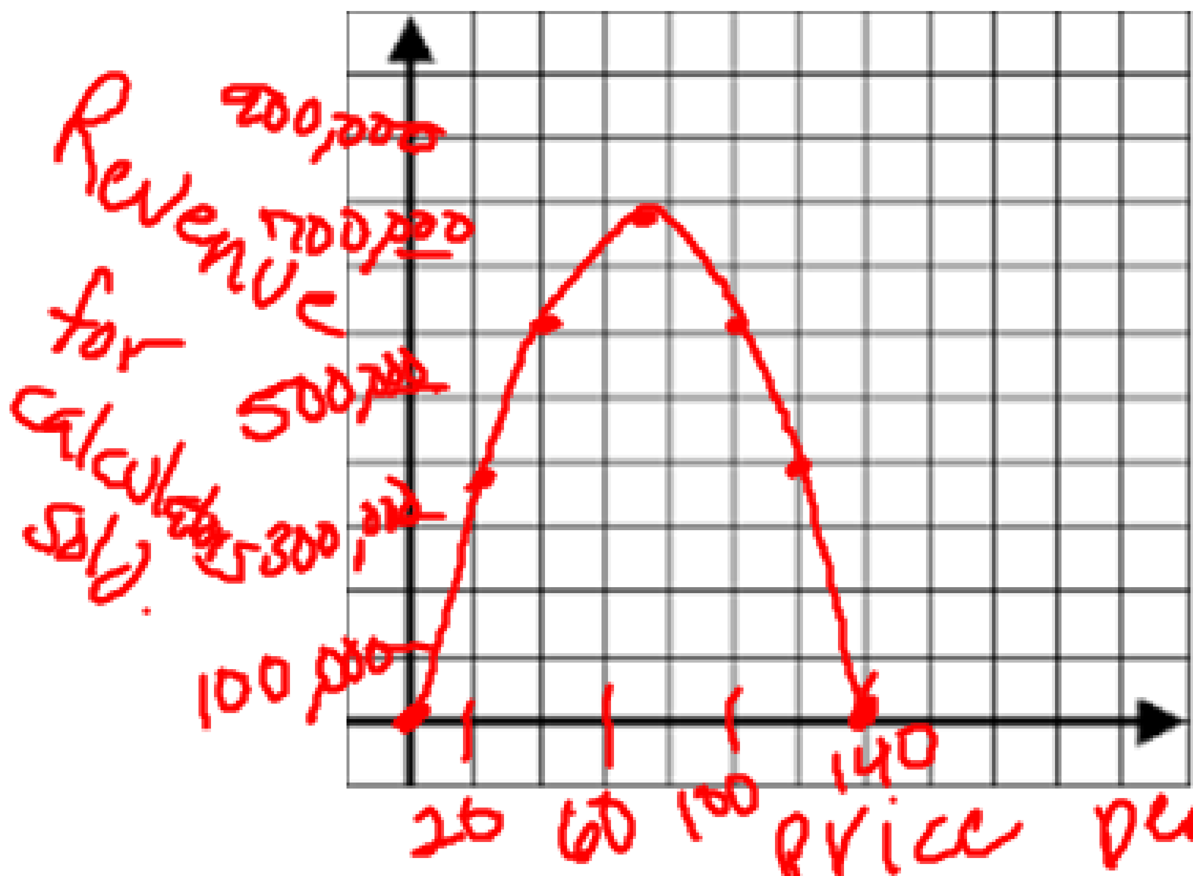
$$x = \boxed{10{,}500 \text{ sold}}$$

EXAMPLE Maximizing Revenue

The marketing department at Texas Instruments has found that, when certain calculators are sold at a price of p dollars per unit, the revenue R (in dollars) as a function of the price p is

$$\cancel{x = 26{,}000 - 160p}$$

(f) Graph R.

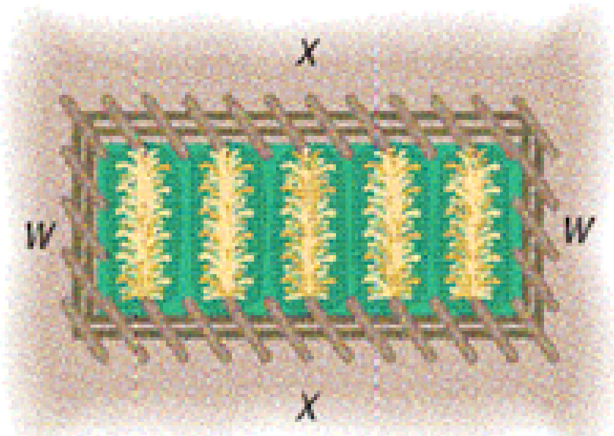


x	R(x)
20	360,000
40	600,000

EXAMPLE

Maximizing the Area Enclosed by a Fence

A farmer has 800 yards of fence to enclose a rectangular field. What are the dimensions of the rectangle that encloses the most area?



$$2x + 2w = 800$$
$$-2x \qquad -2x$$
$$\frac{2w}{2} = \frac{800-2x}{2}$$
$$\boxed{w = 400 - x}$$

$$A = xw$$
$$A = x(400-x)$$
$$A = 400x - x^2$$
$$\boxed{-x^2 + 400x}$$

$$\frac{-b}{2a} = \frac{-400}{2(-1)} = \boxed{200}$$

$x = 200$

$$A(x) = -x^2 + 400x$$

$$A(200) = -(200)^2 + 400(200)$$

$$\boxed{A = 40{,}000 \text{ sq yds}}$$