

p. 284 #46

$$x^2 - 2x + 17 = 0$$

If $ax^2 + bx + c = 0$
then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(17)}}{2(1)}$$

the
discriminant

$$x = \frac{2 \pm \sqrt{-64}}{2}$$

$$\sqrt{-64}$$
$$= \sqrt{-1 \cdot 64}$$

$$x = \frac{2 \pm 8i}{2}$$

$$= 8i$$

$$x = \frac{\cancel{2}(1 \pm 4i)}{\cancel{2}}$$

$$x = 1 \pm 4i$$

#40. $\frac{-15 - \sqrt{-18}}{33}$

$$\sqrt{-18}$$

$$= \sqrt{-1 \cdot 9 \cdot 2}$$

$$= \frac{-15 - 3\sqrt{2}i}{33}$$

$$= 3\sqrt{2}i$$

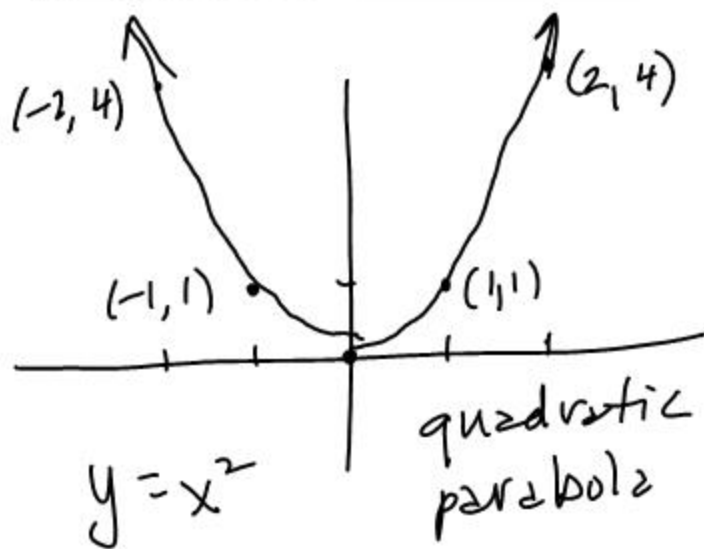
$$= \frac{\cancel{33}(-5 - \sqrt{2}i)}{\cancel{33}11} = \frac{-5 - \sqrt{2}i}{11}$$

$$\begin{aligned}
 \#5. \quad & 6 - (-5 + 4i) - (-13 - i) \\
 & = \underline{6} + \underline{5} - \underline{4i} + \underline{13} + \underline{i} \\
 & = 24 - 3i
 \end{aligned}$$

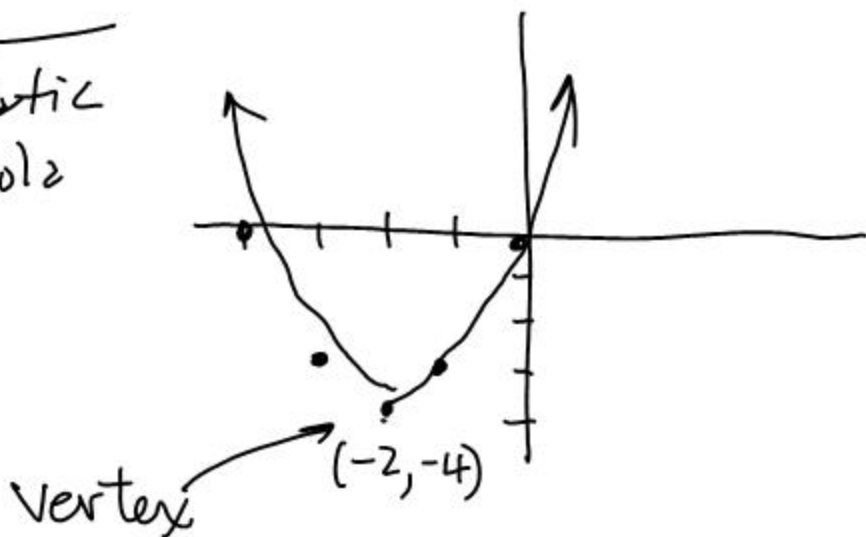
$$\begin{aligned}
 \#17. \quad & (-5 + i)(-5 - i) \\
 & = 25 + \cancel{5i} - \cancel{5i} - \cancel{i^2} \\
 & = 26
 \end{aligned}$$

$$\begin{aligned}
 \#25. \quad & \frac{8i}{4-3i} \cdot \frac{4+3i}{4+3i} = \frac{32i + \cancel{24i^2}}{16 - \cancel{9i^2} + 9} \\
 & = \frac{-24 + 32i}{25} = \frac{-24}{25} + \frac{32}{25}i
 \end{aligned}$$

Quadratic Functions + their graphs



Ex $y = (x+2)^2 - 4$
 ↑ ↑
 left down



Ex $y = x^2 + 4x + 1$ Find the vertex.

First, complete the square.

$$y = (x^2 + 4x + \underline{4}) + 1 - \underline{4}$$

$$y = (x + \underline{2})^2 - \underline{3} \quad \text{vertex: } \underline{(-2, -3)}$$

$$\begin{aligned} & \left[\frac{1}{2}(4) \right]^2 \\ & = 4 \end{aligned}$$

Ex Find the vertex: $y = 8 - 6x - x^2$

$$y = -x^2 - 6x + 8$$

$$y = -\left(x^2 + 6x + \underline{9}\right) + \underline{8+9}$$

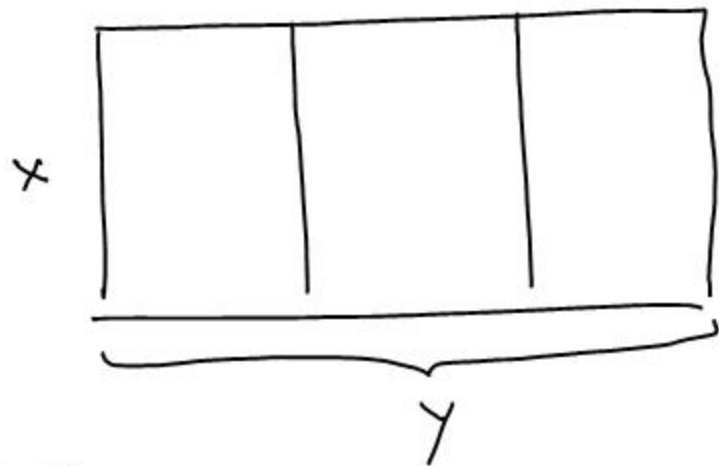
$$y = \downarrow (x+3)^2 + 17$$

vertex $(-3, 17)$



opens down

Ex A corral is to be built as a rectangle divided into 3 sections. The rancher



has 1000 feet of fence to make the corral. Find the largest possible area for the corral

$$4x + 2y = 1000 \rightarrow y = 500 - 2x$$

$$\text{Area} = A = xy \rightarrow A = x(500 - 2x)$$



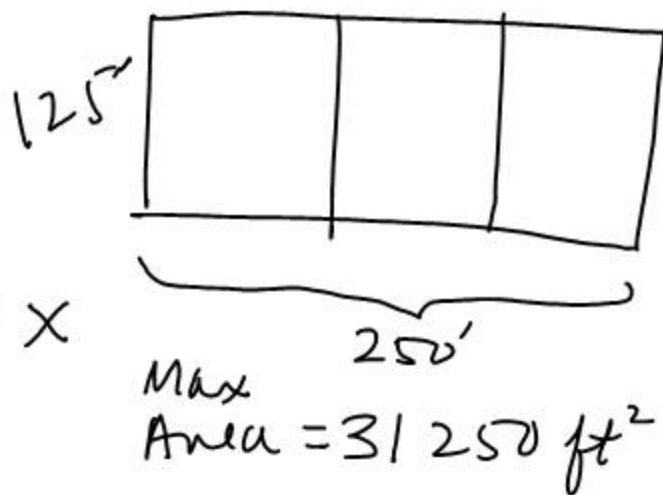
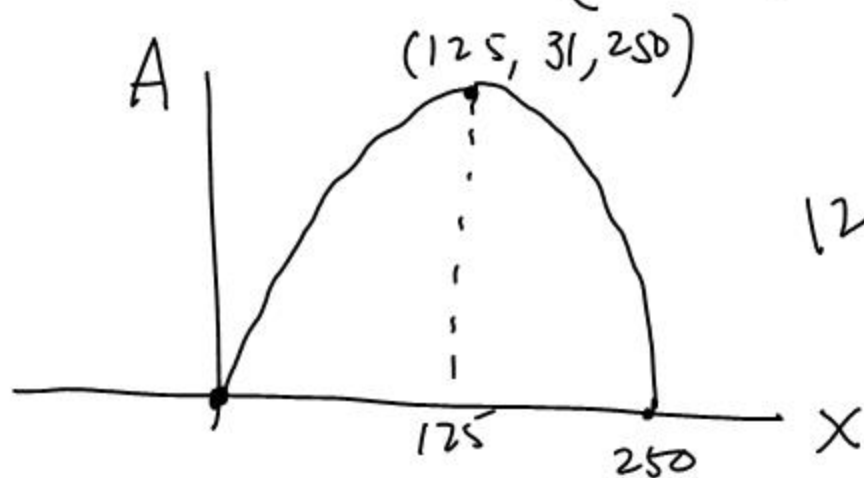
$$A = -2x^2 + 500x$$

$$A = -2x^2 + 500x$$

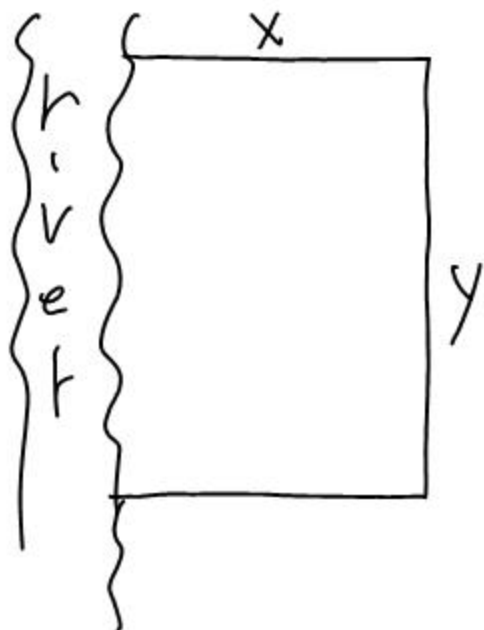
$$= -2(x^2 - 250x + 15625) + 31250$$

$$= -2(x - 125)^2 + 31250$$

vertex : (125, 31250)



Ex.



What's the largest area you can enclose with 1000' of fence?

$$2x + y = 1000 \rightarrow y = 1000 - 2x$$

$$\text{Area} = xy \rightarrow A = x(1000 - 2x)$$

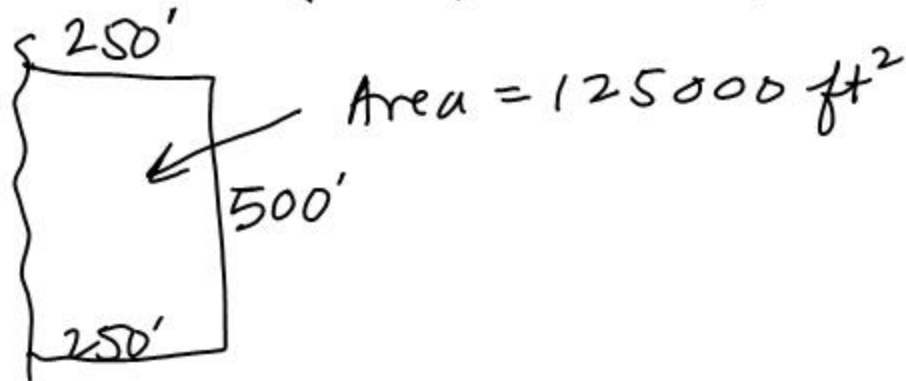
$$A = -2x^2 + 1000x$$

complete the square:

$$A = -2(x^2 - 500x + \underline{62500}) + 125000$$

$$A = -2(x - 250)^2 + 125000$$

vertex: (250, 125000)



HW p. 298

#17 • vertex
#22 • directions

#27

#33,

#37

#40

#65

$$y = x^2 - 1$$

$$y = (x+0)^2 - 1$$

↑
down

$$f(x) = x^2 + 2x + 1$$
$$= (x+1)^2$$