

Topic: equation of parabola
from 3 points on parabola,
none of which is vertex.

Parabola has 3 points:
(0,0), (-1,-2), (1,6)

Write function in
standard form.

$$y = ax^2 + bx + c$$

- ① plug in each point as
(x,y) → linear system.
in a, b, c
- ② solve linear system

$$x=0, y=0: 0 = 0 + 0 + c$$

$$x=-1, y=-2 \left[\begin{array}{l} -2 = a - b \\ 6 = a + b \end{array} \right.$$

$$x=1, y=6: \left[\begin{array}{l} -2 = a - b \\ 6 = a + b \end{array} \right.$$

$$4 = 2a \rightarrow a = 2$$

$$2 + b = 6 \rightarrow b = 4$$

$$y = 2x^2 + 4x$$

$$y = a x^2 + b x + c$$

$$(-1, -2) \quad \begin{array}{l} x = -1 \\ y = -2 \end{array}$$

substitute

$$-2 = a \cdot (-1)^2 + b(-1) + c$$

$$-2 = a \cdot 1 - b + c$$

$$(c = 0)$$

$$-2 = a - b$$

pp 218-219 even answers

$$2. y = -\left(x - \frac{3}{2}\right)^2 + \frac{5}{4}$$

$$18. (0, 3)$$

$$4. y = (x - 1)^2 + 4$$

$$20. (0, -54)$$

$$6. y = 4\left(x + \frac{7}{8}\right)^2 - \frac{49}{16}$$

$$8. y = -2(x - 2)^2 + 11$$

$$10. 4 \times 9 \times 9 \text{ cm}$$

$$12. b = 6, c = -3$$

$$14. a = 1, c = 2$$

#9 $R = -2.5p^2 + 500p$
 $R = \text{revenue}$
 $p = \text{price}$.

quadratic; opens downward



Vertex: $h = \frac{-b}{2a} = \frac{-500}{-5} = 100$
 price = $\$100$

Revenue = $-2.5(100)^2 + 500(100)$
 $= -25,000 + 50,000$
 $= \$25,000$

#10 perimeter 36 cm.
 must be 4 cm high
 what dimensions give
 max volume

$V = l \cdot w \cdot h$ $h = 4$

$= l \cdot w \cdot 4$ $2l + 2w = 36$

$l + w = 18$

$V = l \cdot (18 - l) \cdot 4$ $w = 18 - l$

$V = 4l(18 - l)$
 $= 72l - 4l^2$

$V = -4l^2 + 72l$

l of vertex $h = \frac{-72}{-8} = 9 = l$

p. 223 #7 ① (1, -2), (2, -2), (3, -4)

$$y = ax^2 + bx + c$$

$$y = -x^2 + 3x - 4$$

① $-2 = a + b + c$

② $-2 = 4a + 2b + c$

③ $-4 = 9a + 3b + c$

$$\begin{cases} 1a + 1b + c = -2 \\ 4a + 2b + c = -2 \\ 9a + 3b + c = -4 \end{cases}$$

3x4
matrix

$$\begin{bmatrix} 1 & 1 & 1 & -2 \\ 4 & 2 & 1 & -2 \\ 9 & 3 & 1 & -4 \end{bmatrix}$$

rref

$$\begin{bmatrix} 1 & 0 & 0 & a \\ 0 & 1 & 0 & b \\ 0 & 0 & 1 & c \end{bmatrix} \begin{matrix} -1 \\ 3 \\ -4 \end{matrix}$$

#7	x^2	x	1	y	
	1	1	1	-2	(1, -2)
	4	2	1	-2	(2, -2)
	9	3	1	-4	(3, -4)

$$y = ax^2 + bx + c$$