

2.5 Practice A

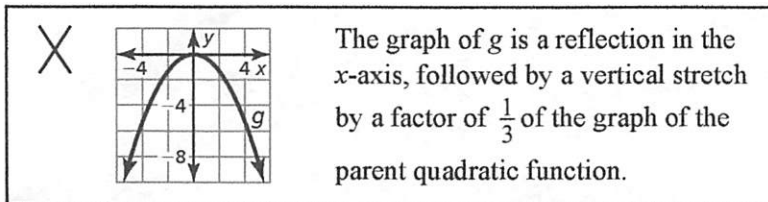
In Exercises 1–6, describe the transformation of $f(x) = x^2$ represented by g .

Then graph each function.

1. $g(x) = x^2 - 2$
2. $g(x) = x^2 + 1$
3. $g(x) = (x + 1)^2$
4. $g(x) = (x - 2)^2$
5. $g(x) = (x - 5)^2$
6. $g(x) = (x + 2)^2 - 1$

In Exercises 7–9, describe the transformation of $f(x) = x^2$ represented by g . Then graph each function.

7. $g(x) = -2x^2$
8. $g(x) = (-2x)^2$
9. $g(x) = \frac{1}{4}x^2$
10. Describe and correct the error in analyzing the graph of $f(x) = -\frac{1}{3}x^2$.



In Exercises 11 and 12, describe the transformation of the graph of the parent quadratic function. Then identify the vertex.

11. $f(x) = 2(x + 3)^2 + 2$
12. $f(x) = -5x^2 - 1$

In Exercises 13 and 14, write a rule for g described by the transformations of the graph of f . Then identify the vertex.

13. $f(x) = x^2$; vertical stretch by a factor of 3 and a reflection in the x -axis, followed by a translation 3 units down
14. $f(x) = 4x^2 + 5$; horizontal stretch by a factor of 2 and a translation 2 units up, followed by a reflection in the x -axis
15. Let the graph of g be a translation 4 units down and 3 units right, followed by a horizontal shrink by a factor of $\frac{1}{2}$ of the graph of $f(x) = x^2$.
 - a. Identify the values of a , h , and k . Write the transformed function in vertex form.
 - b. Suppose the horizontal shrink was performed first, followed by the translations. Identify the values of a , h , and k , and write the transformed function in vertex form.

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In Exercises 1–12, graph the function. Label the vertex and axis of symmetry.

1. $f(x) = (x - 2)^2$

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

3. $g(x) = (x + 2)^2 + 4$

4. $h(x) = (x - 3)^2 - 2$

5. $y = -3(x - 1)^2 + 3$

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

7. $y = x^2 - 2x + 1$

8. $y = 3x^2 + 6x + 1$

9. $y = -3x^2 + 6x + 4$

10. $f(x) = -x^2 + 6x - 3$

11. $g(x) = -x^2 + 2$

12. $f(x) = 5x^2 - 4$

13. Explain why you cannot use the axes of symmetry to distinguish between the quadratic functions $y = 3x^2 + 12x + 1$ and $y = x^2 + 4x + 5$.

14. Which function represents the narrowest parabola? Explain your reasoning.

A. $y = x^2 + 3$

B. $y = 0.5x^2 - 2$

C. $y = 3(x + 2)^2$

D. $y = -2x^2 + 1$

In Exercises 15–18, find the minimum or maximum value of the function. Describe the domain and range of the function, and where the function is increasing and decreasing.

15. $y = 5x^2 + 2$

16. $y = 4x^2 - 3$

17. $y = -x^2 + 4x - 1$

18. $f(x) = -2x^2 + 4x + 9$

19. The number of customers in a grocery store is modeled by the function $y = -x^2 + 10x + 50$, where y is the number of customers in the store and x is the number of hours after 7:00 A.M.

a. At what time is the maximum number of customers in the store?

b. How many customers are in the store at the time in part (a)?

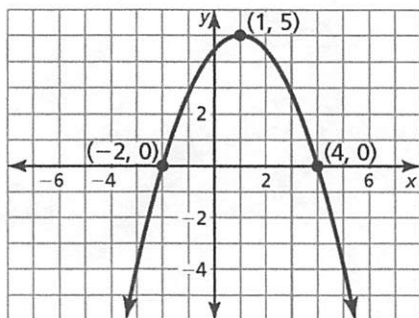
2.7 Practice A

In Exercises 1–3, write an equation of the parabola in vertex form.

- passes through $(6, 4)$ and has vertex $(2, -3)$
- passes through $(-3, -10)$ and has vertex $(3, -8)$
- passes through $(0, -5)$ and has vertex $(-1, 4)$

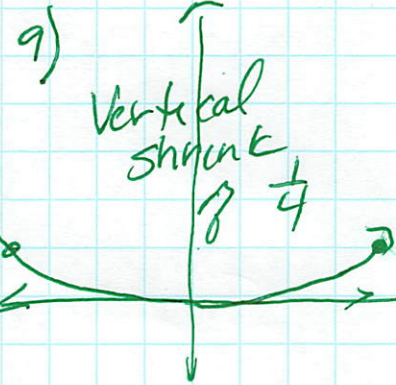
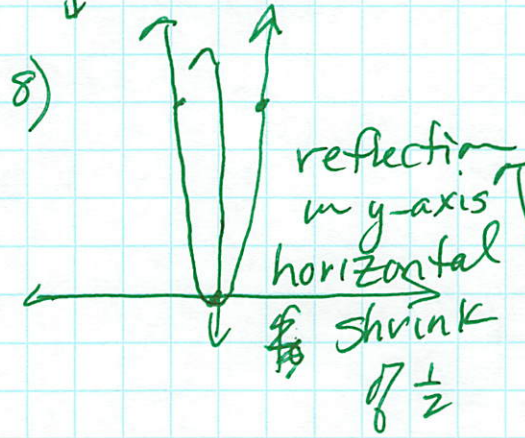
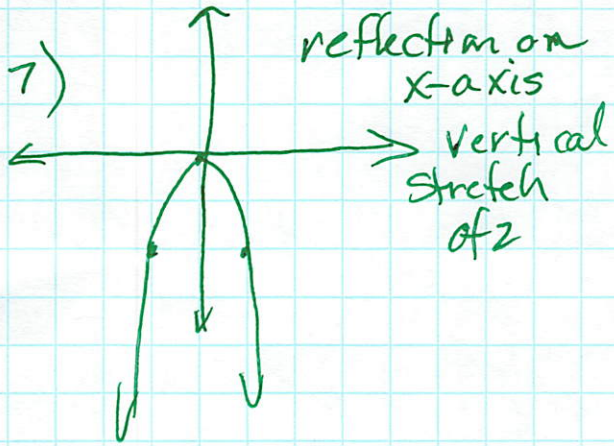
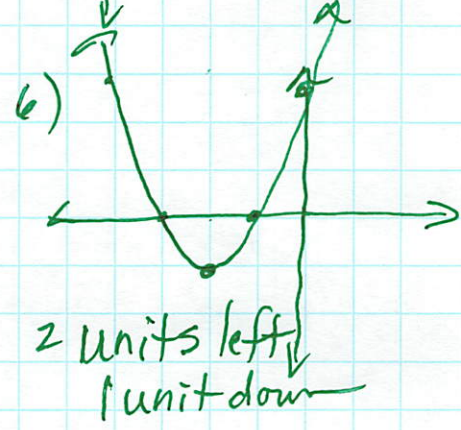
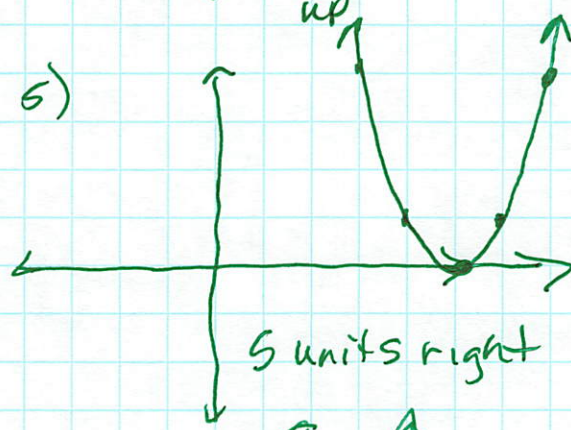
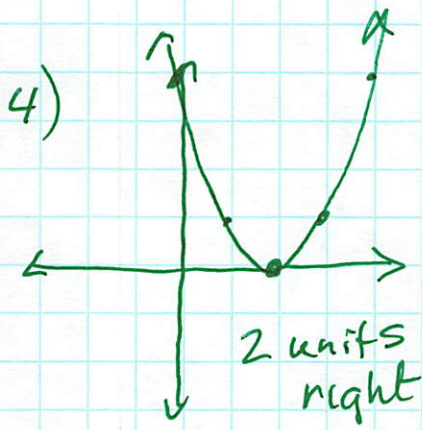
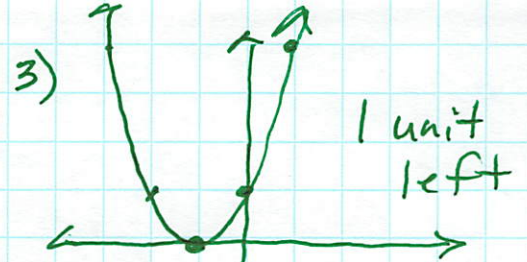
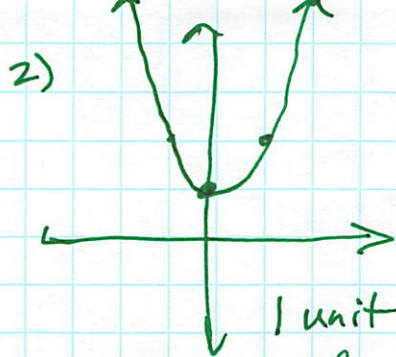
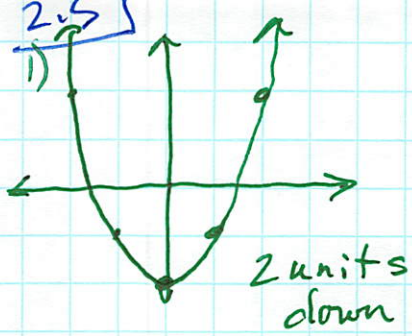
In Exercises 4–6, write an equation of the parabola in intercept form.

- x -intercepts of 10 and 6; passes through $(11, 8)$
- x -intercepts of 2 and 8; passes through $(0, 3)$
- x -intercepts of -14 and -2 ; passes through $(-16, -8)$
- Use the parabola shown.



- Write an equation of the parabola in vertex form.
 - Expand the equation in part (a) to the form $y = ax^2 + bx + c$.
 - Write an equation of the parabola in intercept form.
 - Expand the equation in part (c) to the form $y = ax^2 + bx + c$.
 - Do both methods give an equation that represents the parabola? Which method did you find easier? Explain.
8. A basketball is thrown up in the air. The table shows the heights y (in feet) of the basketball after x seconds. Write and solve an equation to determine how long the ball is above 6 feet. How long is the ball in the air?

| | | | | |
|------------------------|---|----|----|----|
| Time, x | 0 | 6 | 12 | 18 |
| Basketball height, y | 5 | 10 | 10 | 5 |



10) Vertical shrink of $\frac{1}{3}$
not a stretch

11) 3 units left, 2 units up
vertical stretch of 2
 $V(-3, 2)$

12) Vertical stretch of 5,
Reflection in x-axis
1 unit down
 $V(0, -1)$

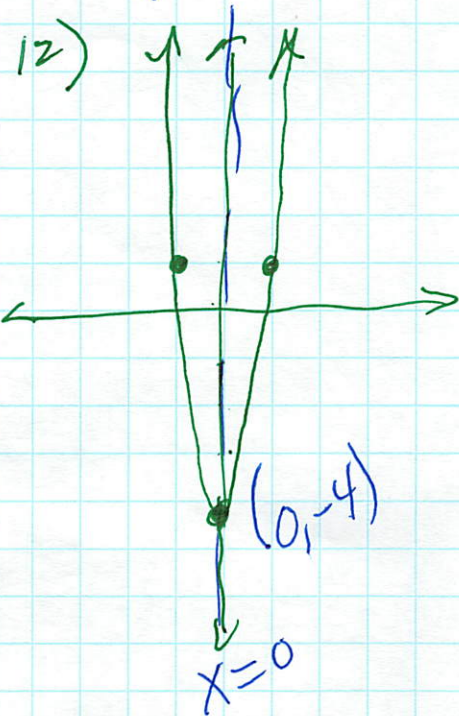
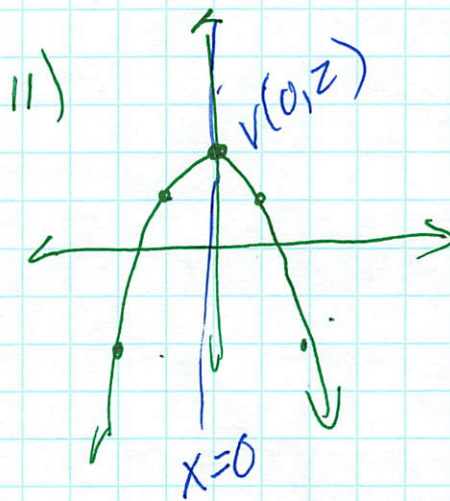
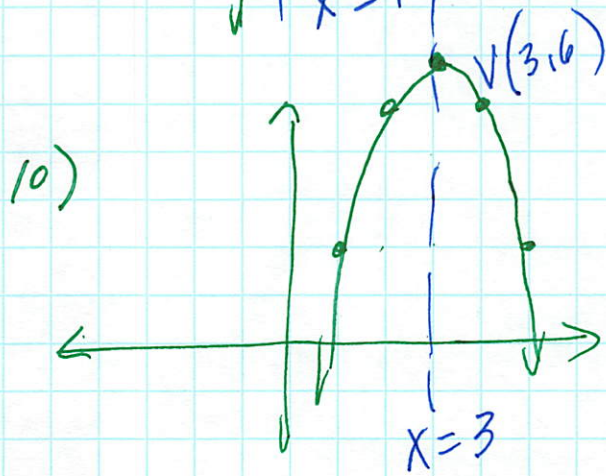
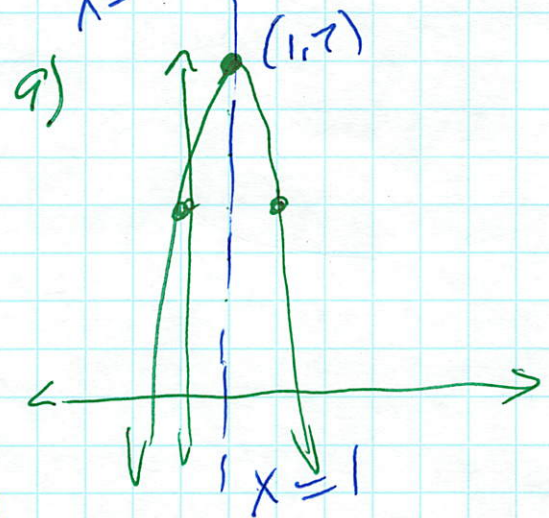
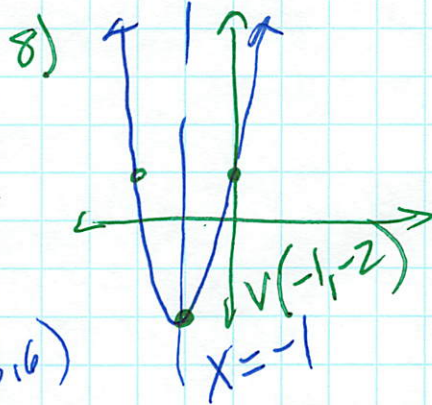
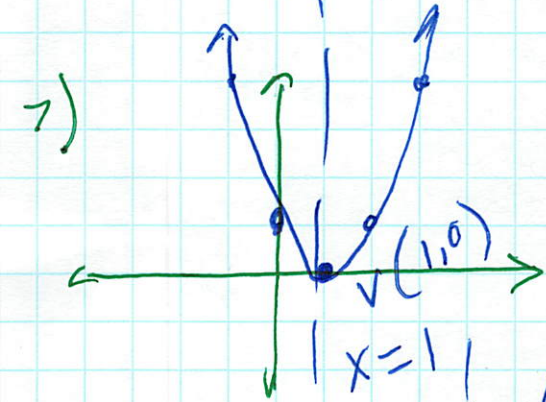
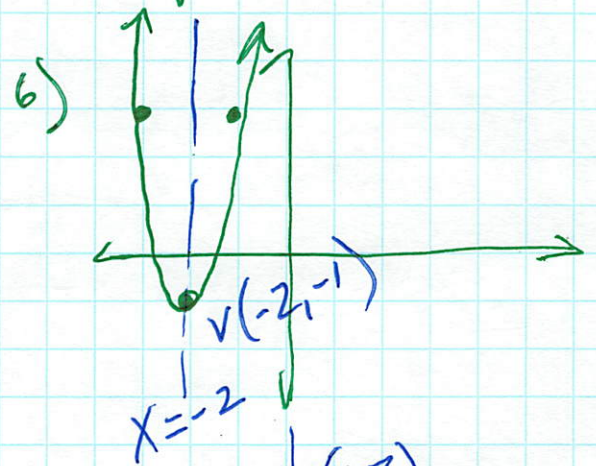
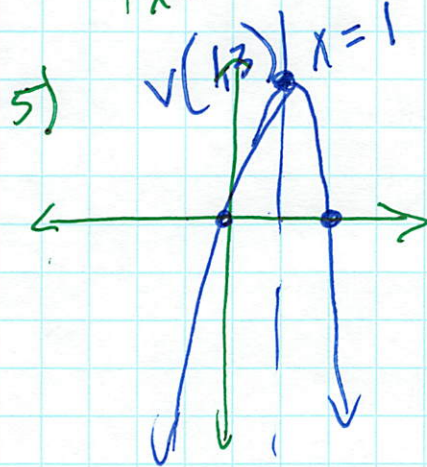
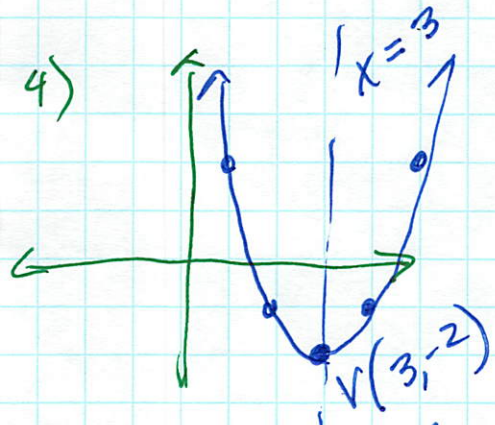
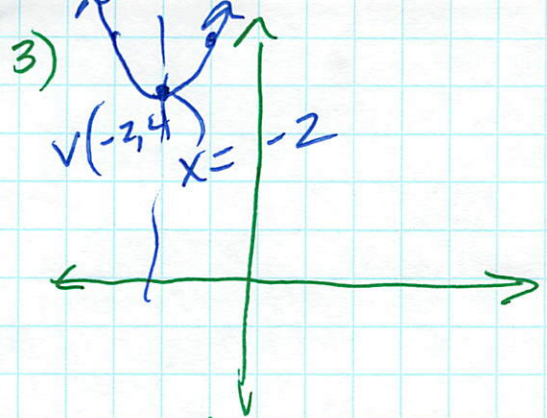
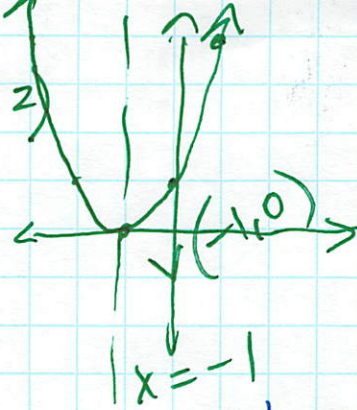
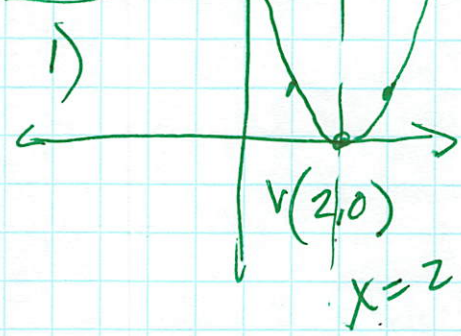
13) $g(x) = -3x^2 - 3$
 $V(0, -3)$

14) $g(x) = -x^2 - 7$
 $V(0, -7)$

15 a) $a=2$ $h=3$ $k=-4$
 $g(x) = (2x-3)^2 - 4$

b) $a=4$ $h=3$ $k=-4$
 $g(x) = 4(x-3)^2 - 4$

2.6)



2.6 cont

13) Both graphs have the same axis of symmetry

14) C. It has the largest leading coefficient

15) min 2, Domain: \mathbb{R} R: $y \geq 2$ increasing to right of 0
decreasing to left of 0

16) min. -3, Domain: \mathbb{R} R: $y \geq -3$ increasing to right of 0
decreasing to left of 0

17) max 3, Domain: \mathbb{R} R: $y \leq 3$ increasing to the left of 2
decreasing to the right of 2

18) max 11, Domain: \mathbb{R} R: $y \leq 11$ increasing to the left of 1
decreasing to the right of 1

19) a) Noon or 12 p.m.

b) 75 customers

2.7

$$1) y = \frac{7}{16}(x-2)^2 - 3$$

$$2) y = -\frac{1}{18}(x-3)^2 - 8$$

$$3) y = -9(x+1)^2 + 4$$

$$4) y = \frac{8}{5}(x-10)(x-6)$$

$$5) y = \frac{3}{16}(x-2)(x-8)$$

$$6) y = -\frac{2}{7}(x+14)(x+2)$$

$$7) a) -\frac{5}{9}(x-1)^2 + 5$$

$$b) -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$$

$$c) -\frac{5}{9}(x+2)(x-4)$$

$$d) y = -\frac{5}{9}x^2 + \frac{10}{9}x + \frac{40}{9}$$

e) yes, intercept form, the intercepts were given

$$8) 6 = -0.069x^2 + 1.25x + 5$$

$$12.277 - 0.839 = 16 \text{ sec}$$

about 21.5 sec