A1 S2 w6d4 9-1 Quad functions and equations

1. Skill 12: Simply Exponential Expressions. Simplify, leaving no negative exponents.
          Show all steps.

$$\frac{7x^{-5}\left(x^4\right)^2 \cdot x^0}{\left(14x^5\right)^2}$$

2. Skill 13: Multiplying Polynomials: Use a rectangle to multiply and solve the following
          problem.

$$\left(5x^3 + 9x^2 - 3\right)\left(11x - 1\right)$$

3. Skill 14: Factor a trinomial

$$10x^2 + 85x + 105$$

4. Factor each expression.

a.) $18h^3 + 45h^2 - 8h - 20$ b.) $36v^3 - 126v^2 + 48v - 168$

5. Put into standard form, then name the polynomial based on its degree and number
    of terms.

a. $15 - x$

b. $5b^3 + x^2$

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Notes 9-1   Quadratic Graphs and Their Properties

take note

Key Concept   Standard Form of a Quadratic Function

A **quadratic function** is a function that can be written in the form $y = ax^2 + bx + c$, where $a \neq 0$. This form is called the **standard form of a quadratic function.**

Examples $y = 3x^2$ $y = x^2 + 9$ $y = x^2 - x - 2$

The highest or lowest point of a parabola is its **vertex,** which is on the axis of symmetry.

If $a > 0$ in $y = ax^2 + bx + c$, the parabola opens upward.

$\downarrow$

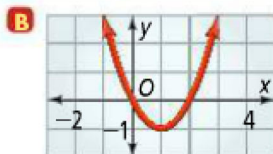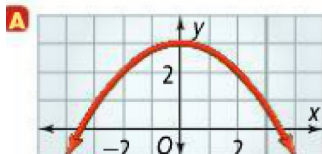The vertex is the **minimum** point, or lowest point, of the parabola.

If $a < 0$ in $y = ax^2 + bx + c$, the parabola opens downward.

$\downarrow$

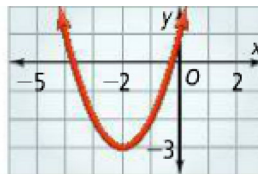The vertex is the **maximum** point, or highest point, of the parabola.

Problem 1 Identifying a Vertex

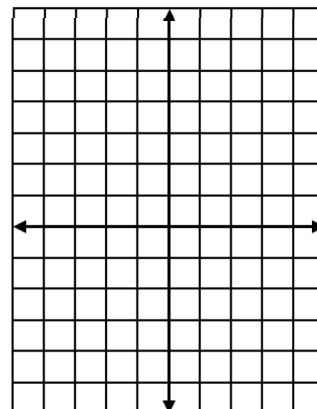What are the coordinates of the vertex of each graph? Is it a minimum or a maximum?

A

B

Now you try: What is the vertex of the graph at the right? Is it a minimum or a maximum?
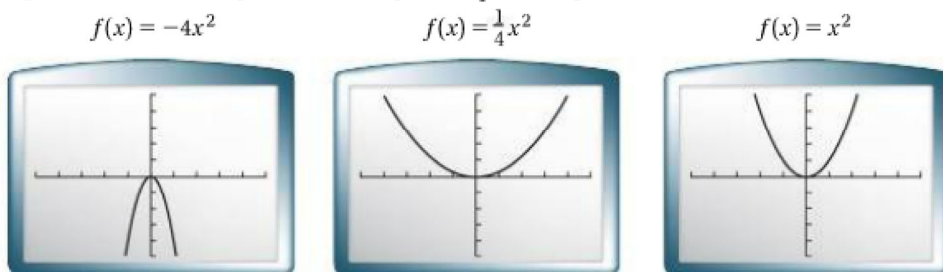
Problem 2 Graphing $y = ax^2$

Graph the function $y = x^2$. Make a table of values. What are the domain and range?

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Problem 3 Comparing Widths of Parabolas

Use the graphs below. What is the order, from widest to narrowest, of the graphs of the quadratic functions $f(x) = -4x^2$, $f(x) = \frac{1}{4}x^2$, and $f(x) = x^2$?

$f(x) = -4x^2$ $f(x) = \frac{1}{4}x^2$ $f(x) = x^2$

Got It? 3. What is the order, from widest to narrowest, of the graphs of the functions $f(x) = -x^2$, $f(x) = 3x^2$, and $f(x) = -\frac{1}{3}x^2$?
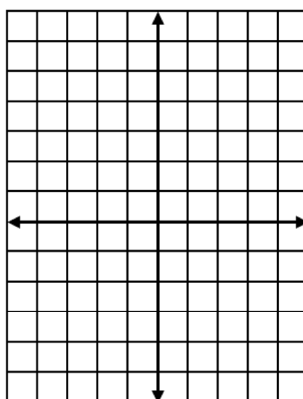
Problem 4 Graphing $y = ax^2 + c$

Multiple Choice How is the graph of $y = 2x^2 + 3$ different from the graph of $y = 2x^2$?

A It is shifted 3 units up.   C It is shifted 3 units to the right.

B It is shifted 3 units down.   D It is shifted 3 units to the left.

x	$y = 2x^2$	$y = 2x^2 + 3$
−2	8	11
−1	2	5
0	0	3
1	2	5
2	8	11
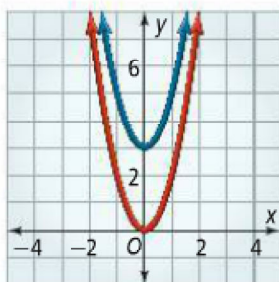
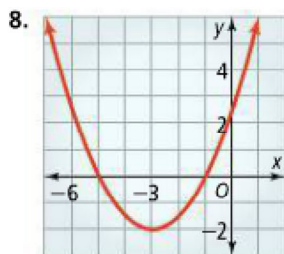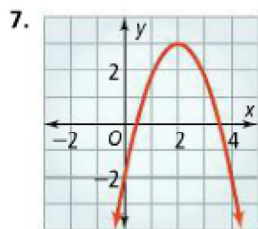**Got It? 4.** Graph $y = x^2$ and $y = x^2 - 3$. How are the graphs related?

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HW: page 550

Identify the vertex of each parabola. Tell whether it is a minimum or a maximum.   ⬅ **See Problem 1.**

7.

8.

9.

x	y
0	8
1	2
2	0
3	2
4	8

Order each group of quadratic functions from widest to narrowest graph.   ⬅ **See Problem 3.**

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

17. $f(x) = 5x^2, f(x) = -3x^2, f(x) = x^2$

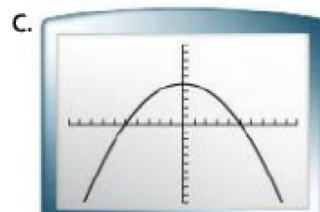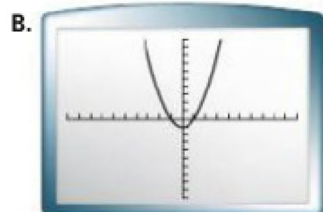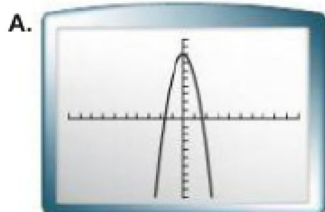**18.** $y = -\frac{1}{2}x^2, y = 5x^2, y = -\frac{1}{4}x^2$

19. $f(x) = -2x^2, f(x) = -\frac{2}{3}x^2, f(x) = -4x^2$

Match each function with its graph.

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

35. $f(x) = -3x^2 + 8$

36. $f(x) = -0.2x^2 + 5$

A.

B.

C.

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Simplify. Write each answer in standard form.

12. $\left(2v^3 - v + 8\right) + \left(-v^3 + v - 3\right)$

14. $\left(4h^3 + 3h + 1\right) - \left(-5h^3 + 6h - 2\right)$

Find the GCF of the terms of each polynomial. Then factor the polynomial.

22. $12p^4 + 16p^3 + 8p$

24. $45c^5 - 63c^3 + 27c$

Simplify each product. Write in standard form.

36. $(6c + 5)^2$

Factor each expression.

42. $g^2 - 5g - 14$

44. $6k^2 - 10k\ell + 4\ell^2$

50. $3x^2 + 3x - 6$

54. $-2h^2 + 4h + 70$