

SECTIONS 2.5A

GRAPHING TECHNIQUES; VERTICAL AND HORIZONTAL SHIFTS

homework

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#8, 12, 14, 17, 40, 44, 46

Only Graph

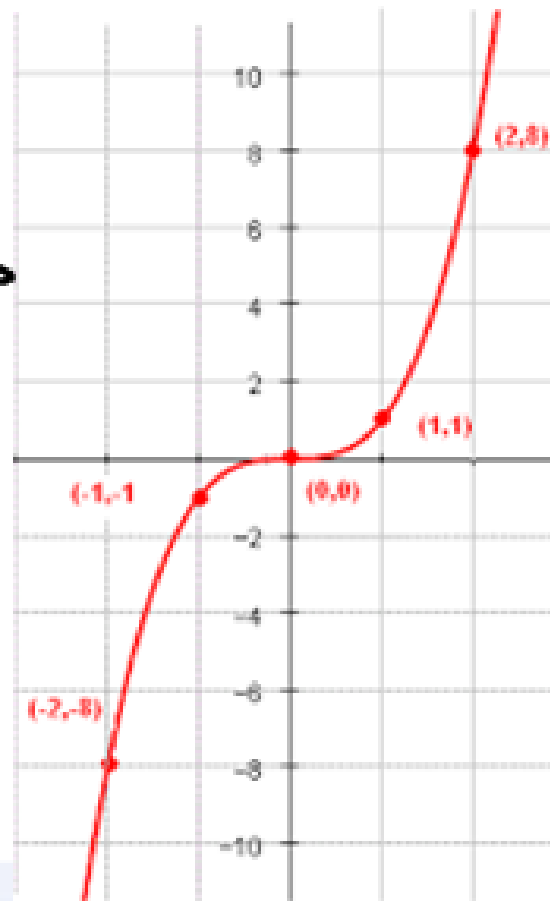
OBJECTIVE 1

GRAPH FUNCTIONS USING VERTICAL AND
HORIZONTAL SHIFTS

Quiz

- ▶ Identify the basic function with a graph as below:

$$f(x) = x^3$$



Exploration...

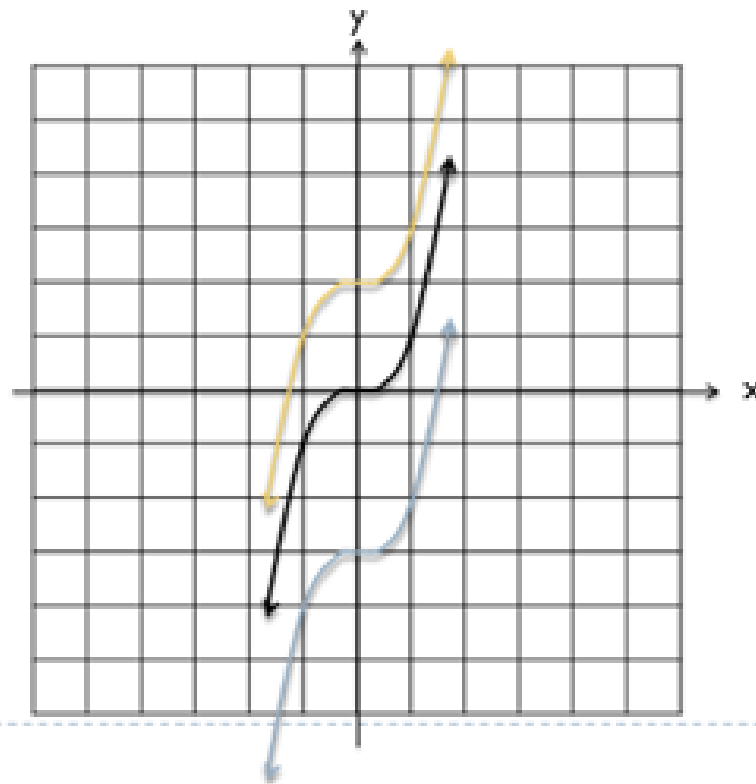
On the Same screen, Graph each of the following functions:

▶ Discussion 2

Parent Function $\rightarrow f(x) = x^3$

↑ 2 unit $f(x) = x^3 + 2$

↓ 3 unit $f(x) = x^3 - 3$



If $c > 0$, then the graph of $y = f(x) + c$ is obtained by shifting the graph of $y = f(x)$ **upward** a distance of c units. The graph of $y = f(x) - c$ is obtained by shifting the graph of $y = f(x)$ **downward** a distance of c units.

Example: ... Vertical Shifts

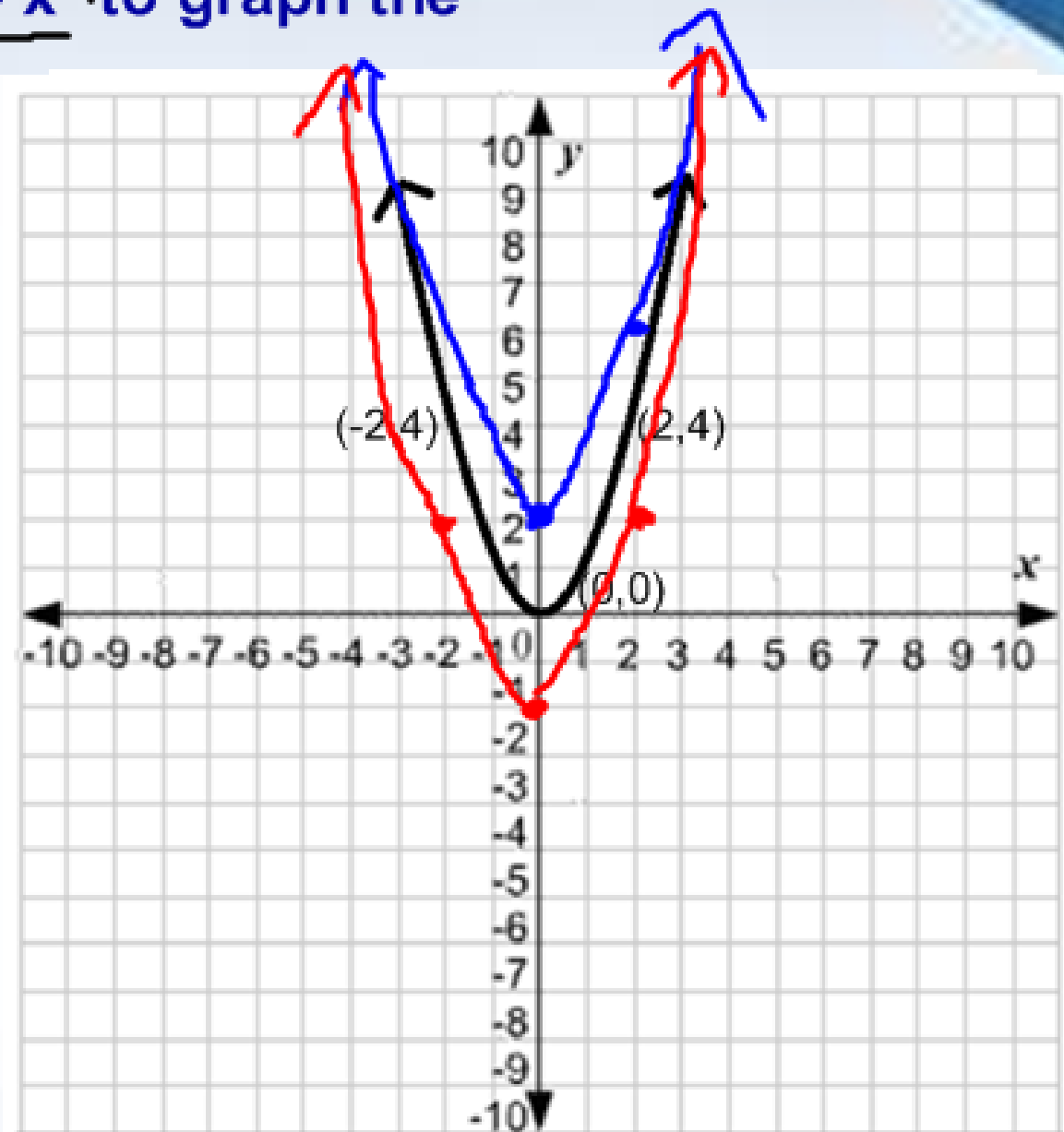
Use the graph of $f(x) = x^2$ to graph the following:

(a) $g(x) = x^2 + 2$

* up 2 units

* (b) $h(x) = x^2 - 2$

down 2 units



Example: ... Vertical Shifts

Parent Function

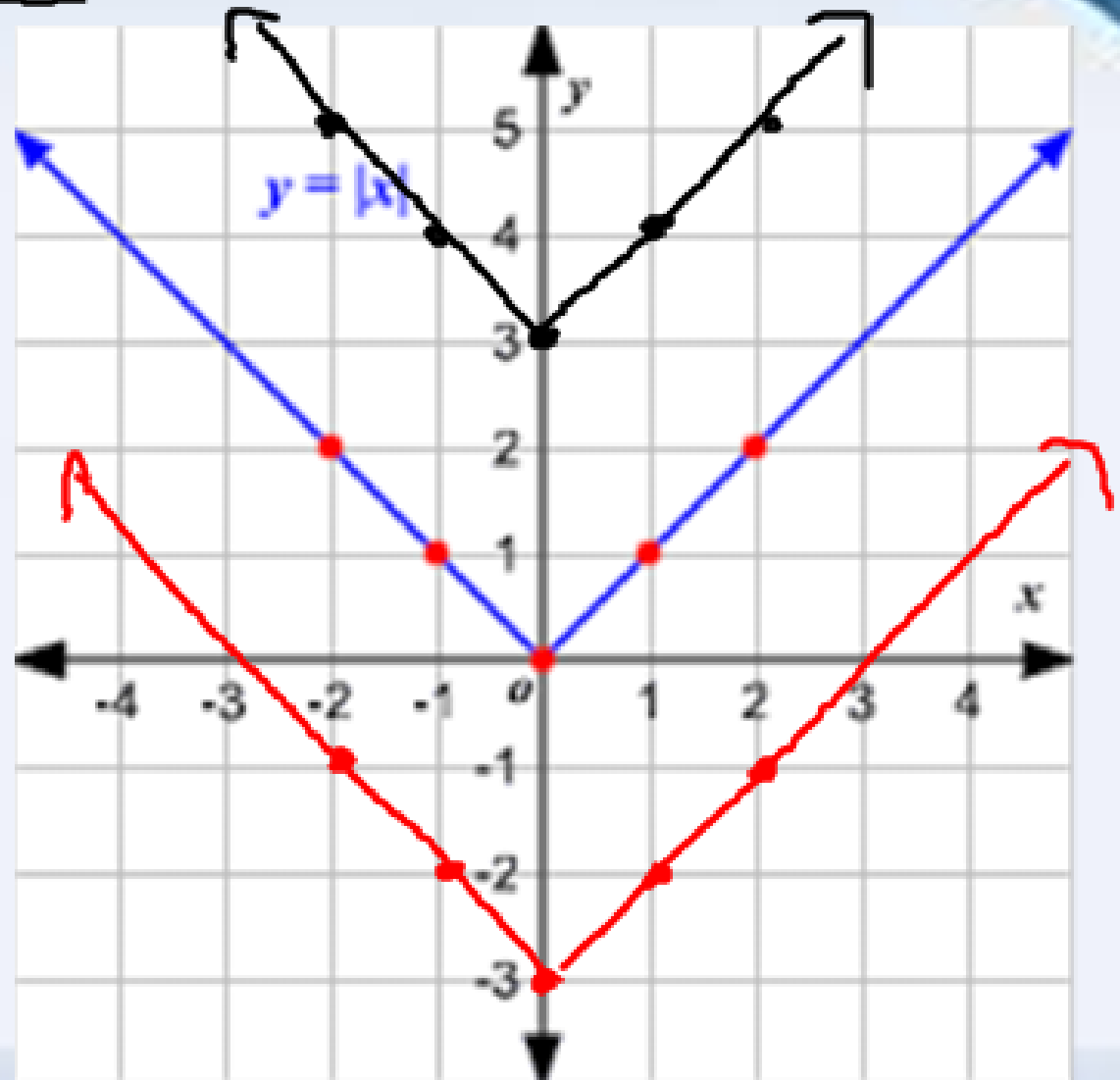
Use the graph of $f(x) = |x|$ to graph the following:

* (a) $g(x) = |x| + 3$

up 3 units

* (b) $h(x) = |x| - 3$

down 3.

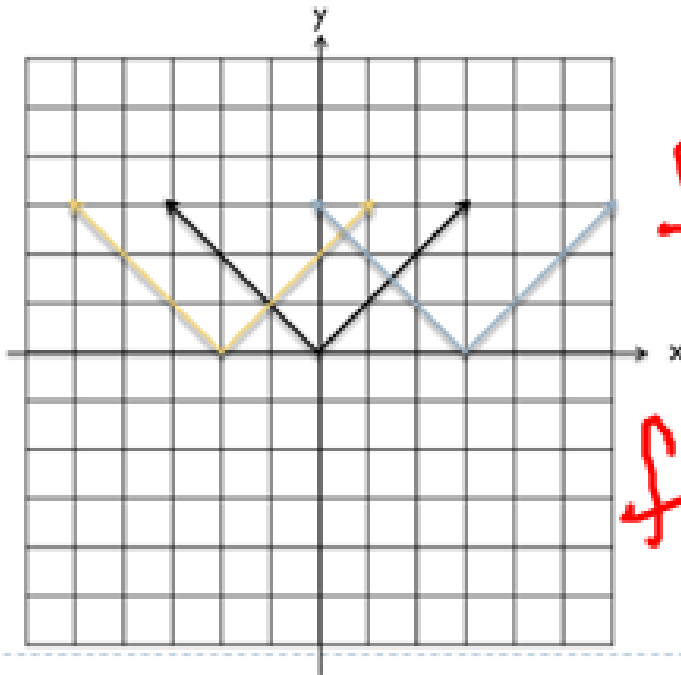


Exploration...

On the Same screen, Graph each of the following functions:

▶ Discussion 2

→ $f(x) = |x|$
← 2 unit $f(x) = |x + 2|$
→ 3 unit $f(x) = |x - 3|$



parent function.

$$f(x) = |x|$$

$$f(x+2) = |x+2|$$

- ▶ If $c > 0$, the graph of $y = f(x + c)$ is obtained by shifting the graph of $y = f(x)$ to the **left** a distance of c units. The graph of $y = f(x - c)$ is obtained by shifting the graph of $y = f(x)$ to the **right** a distance of c units.

Example: ... Horizontal Shifts

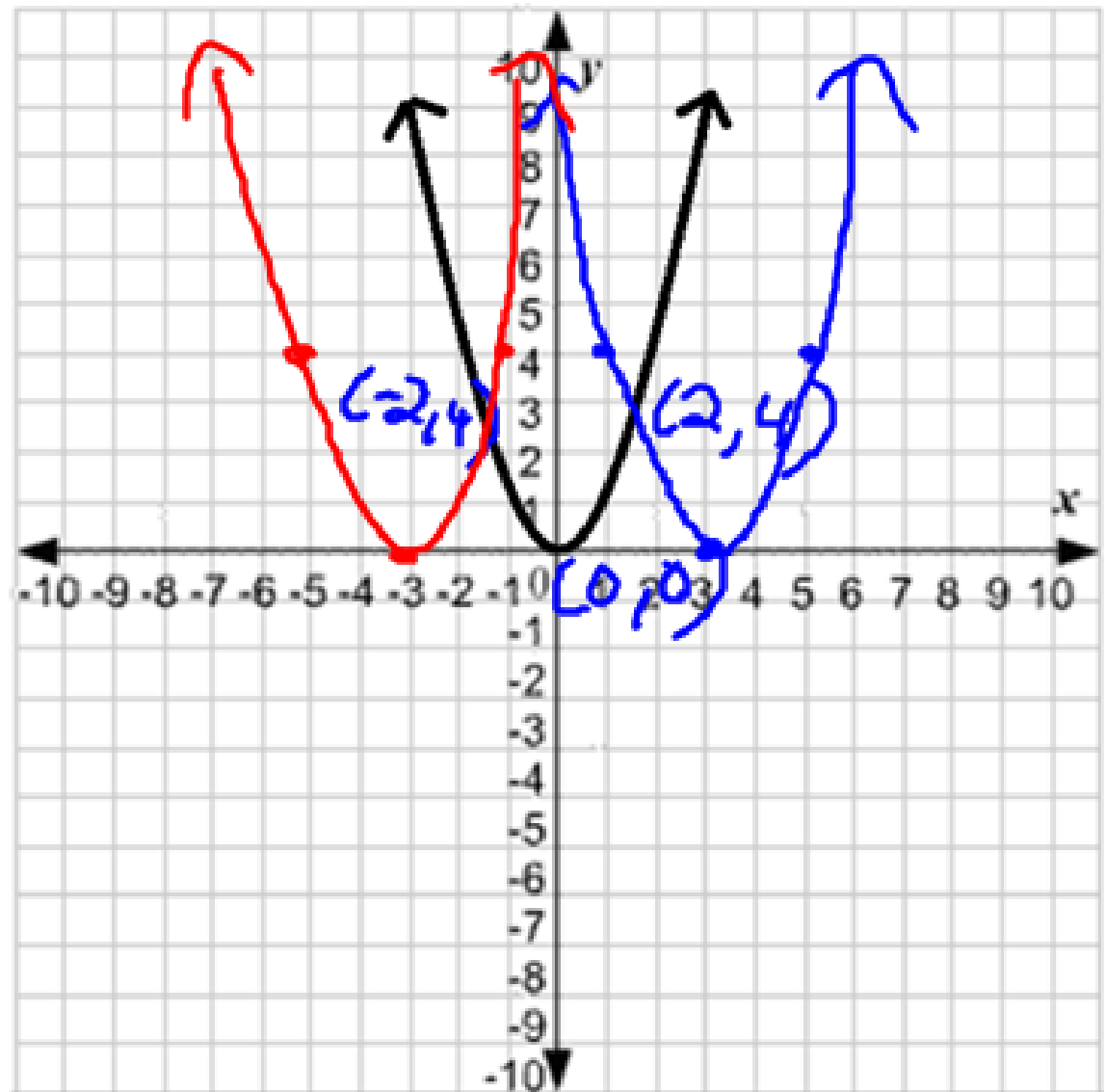
Use the graph of $f(x) = x^2$ to graph the following:

*a) $g(x) = (x - 3)^2$

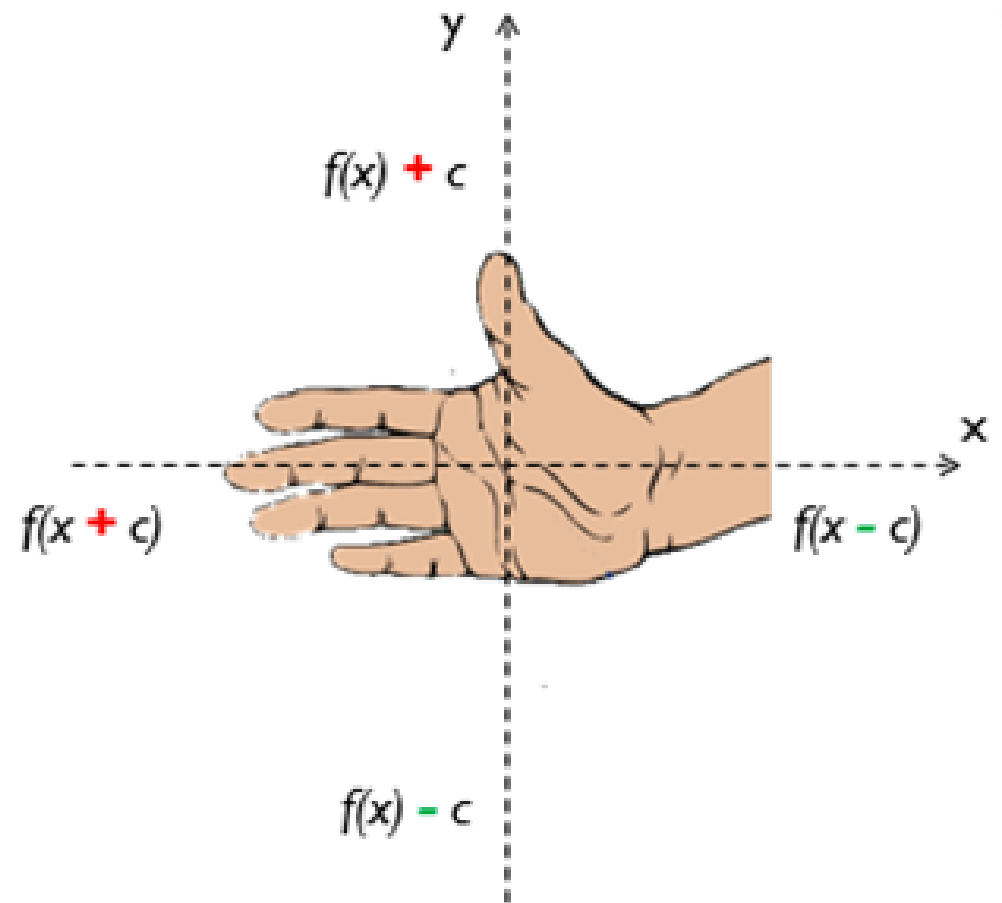
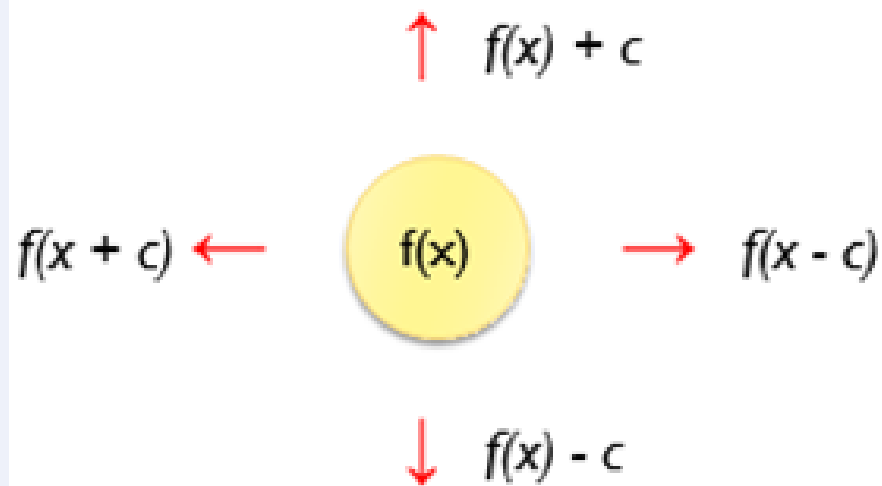
right 3 units

*b) $h(x) = (x + 3)^2$

left 3 units



Conclusion



Combinations of vertical and horizontal shifts

► *Equation* → write a description

$y_1 = |x - 4| + 3$. Describe the transformation of $f(x) = |x|$.

4 units right
3 units up,

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graph only