

Function Transformations

Foundation to Challenge

Practice should make the test feel easier, not merely familiar.

Work without the answer key first. Check answers through the SAT Practice Library after completing the set.

FOUNDATION

1 The graph $y = x^2$ is shifted 4 units left and 3 units up. Which equation results?

- A. $y = (x + 4)^2 + 3$
- B. $y = (x - 4)^2 + 3$
- C. $y = (x + 4)^2 - 3$
- D. $y = (x - 4)^2 - 3$

2 The graph $y = \sqrt{x}$ is shifted 6 units right and 1 unit down. Which equation results?

- A. $y = \sqrt{x + 6} - 1$
- B. $y = \sqrt{x - 6} - 1$
- C. $y = \sqrt{x - 6} + 1$
- D. $y = \sqrt{x + 6} + 1$

STANDARD

3 The graph $y = \frac{1}{x+1}$ is shifted 2 units left and 4 units up. Which equation results?

- A. $y = \frac{1}{x+3} + 4$
- B. $y = \frac{1}{x-1} + 4$
- C. $y = \frac{1}{x+3} - 4$
- D. $y = \frac{1}{x-1} - 4$

ADVANCED

- 4 The graph $y = x^2 - 4x$ is shifted 3 units right and 2 units down. Which equation results after expansion?
- A. $y = x^2 - 10x + 19$
 - B. $y = x^2 - 6x + 7$
 - C. $y = x^2 - 10x + 21$
 - D. $y = x^2 + 2x - 2$

FOUNDATION

- 5 Which translation changes $y = 3x^2 - 5$ to $y = 3x^2 + 2$?
- A. 7 units down
 - B. 7 units up
 - C. 2 units left
 - D. 5 units right

STANDARD

- 6 The curve $xy = 10$ is translated 5 units left and 2 units up. Which equation represents the new curve?
- A. $(x + 5)(y - 2) = 10$
 - B. $(x - 5)(y + 2) = 10$
 - C. $(x + 5)(y + 2) = 10$
 - D. $(x - 5)(y - 2) = 10$

ADVANCED

- 7 The line $3x + 2y = 18$ is translated 4 units right and 3 units down. Which equation represents the translated line?
- A. $3x + 2y = 24$
 - B. $3x + 2y = 12$
 - C. $3x + 2y = 36$
 - D. $3x + 2y = 18$

FOUNDATION

- 8** The circle $x^2 + y^2 = 25$ is translated 2 units right and 6 units down. What is its equation?
- A. $(x - 2)^2 + (y + 6)^2 = 25$
 - B. $(x + 2)^2 + (y - 6)^2 = 25$
 - C. $(x - 2)^2 + (y - 6)^2 = 25$
 - D. $(x + 2)^2 + (y + 6)^2 = 25$

STANDARD

- 9** A circle $(x - 3)^2 + (y + 5)^2 = 49$ is translated 4 units left and 7 units up. Which equation results?
- A. $(x + 1)^2 + (y - 2)^2 = 49$
 - B. $(x - 7)^2 + (y + 12)^2 = 49$
 - C. $(x + 1)^2 + (y + 2)^2 = 49$
 - D. $(x - 1)^2 + (y - 2)^2 = 49$

FOUNDATION

- 10** The graph $f(x) = x^2 + 4$ is reflected across the x-axis. Which equation defines g ?
- A. $g = x^2 - 4$
 - B. $g = -x^2 + 4$
 - C. $g = -(x^2 + 4)$
 - D. $g = (x - 4)^2$

- 11** The graph $f(x) = (x - 6)^2 + 1$ is reflected across the y-axis. Which equation results?
- A. $g = (x + 6)^2 + 1$
 - B. $g = -(x - 6)^2 + 1$
 - C. $g = (x - 6)^2 - 1$
 - D. $g = -(x + 6)^2 + 1$

12 The graph $f(x) = \sqrt{x}$ is reflected across the x-axis and shifted 5 units up. Which equation results?

- A. $g = \sqrt{x} + 5$
- B. $g = -\sqrt{x} + 5$
- C. $g = \sqrt{x} - 5$
- D. $g = -\sqrt{x} - 5$

13 The graph $f(x) = x^2$ is reflected across the x-axis and shifted 3 units right. Which equation results?

- A. $g = -(x+3)^2$
- B. $g = -(x-3)^2$
- C. $g = (x+3)^2$
- D. $g = (x-3)^2$

STANDARD

14 The graph $f(x) = 3x + 4$ is reflected across the y-axis and then across the x-axis. Which equation results?

- A. $g = 3x - 4$
- B. $g = -3x + 4$
- C. $g = 3x + 4$
- D. $g = -3x - 4$

ADVANCED

15 The graph $f(x) = (x-2)^2 - 5$ is reflected across the x-axis and shifted 4 units left. Which equation results?

- A. $g = -(x+2)^2 + 5$
- B. $g = -(x-6)^2 + 5$
- C. $g = (x+2)^2 - 5$
- D. $g = -(x+2)^2 - 5$

CHALLENGE

- 16 $T(x) = (x - 4)(x + 1)(x + 3)$. If $j(x) = T(x - 2)$, what is the sum of the squares of the three x -intercepts of j ?

ADVANCED

- 17 If $f(x) = (x - 4)^2$ and $g(x) = x^2 + 6x + 9$, the graph of g is the graph of f shifted k units left. What is k ?

FINISHED?

Check your answers online

aryalanupme.github.io/sat-function-transformations.html

Do not stop at “wrong.” Identify why it was wrong: concept, algebra, arithmetic, interpretation, calculator choice, or timing.

I do not correct the answer first. I correct the reason.

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