

Algebra 2 - Composition and Inverse Functions - Test Answer Key

Common Core F-BF.A.1c, F-BF.B.4a · maths-pdf.fr/en/

Use this answer key and scoring guide to grade the test on composition and inverse functions (F-BF.A.1c). Each solution shows the full reasoning, and the scoring note explains how many points to award for correct setup, correct work, and a correct final answer. Partial credit rewards a sound method even when a small arithmetic slip changes the result.

Algebra 2 · Common Core State Standards: **F-BF.A.1c, F-BF.B.4a**

Question 1 - Compose from tables [2 pts]

$$g(1) = 0, \text{ so } f(g(1)) = f(0) = 2. \quad f(2) = 1, \text{ so } g(f(2)) = g(1) = 0.$$

$$\mathbf{f(g(1)) = 2; g(f(2)) = 0}$$

Scoring: 1 point for each value.

Question 2 - Compose expressions [3 pts]

$$f(g(x)) = (2x+3)^2 - 1 = 4x^2 + 12x + 9 - 1 = 4x^2 + 12x + 8.$$

$$g(f(x)) = 2(x^2 - 1) + 3 = 2x^2 + 1.$$

$$\mathbf{4x^2 + 12x + 8 \text{ and } 2x^2 + 1; \text{ not equal}}$$

Scoring: 1 point for each composition, 1 point for the comparison.

Question 3 - Domain [2 pts]

$$f(g(x)) = \sqrt{x-5}. \text{ The radicand must be nonnegative: } x \geq 5.$$

$$\sqrt{x-5}, \text{ domain } x \geq 5$$

Scoring: 1 point for the composition, 1 point for the domain.

Question 4 - Linear inverse [2 pts]

Swap: $x = \frac{y-4}{5}$, so $y = 5x + 4$.

$$f^{-1}(x) = 5x + 4$$

Scoring: 1 point for swapping, 1 point for solving.

Question 5 - Rational inverse [3 pts]

Swap: $x = \frac{2y+1}{y-3}$. Multiply: $xy - 3x = 2y + 1$.

Collect y terms: $xy - 2y = 3x + 1$, so $y(x-2) = 3x + 1$.

$$f^{-1}(x) = \frac{3x+1}{x-2}$$

Scoring: 1 point for swapping and clearing the fraction, 1 point for collecting the y -terms, 1 point for the inverse.

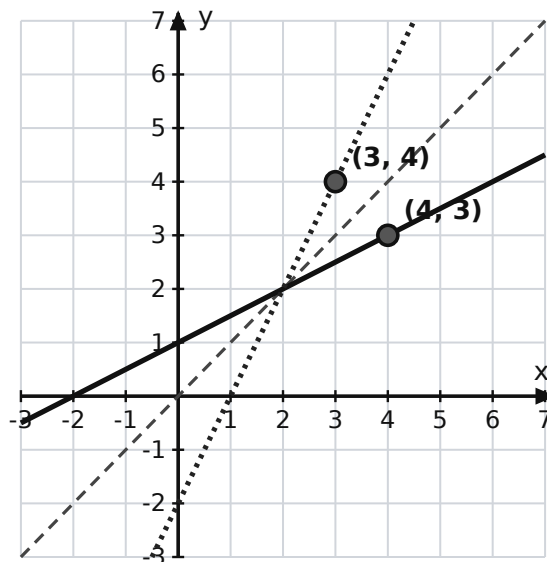
Question 6 - Verify [2 pts]

$$f(g(x)) = \sqrt[3]{x^3 - 7 + 7} = x \cdot g(f(x)) = (\sqrt[3]{x+7})^3 - 7 = x.$$

Both compositions give x

Scoring: 1 point for each composition.

Question 7 - Graph of an inverse [2 pts]



(4, 3) and (3, 4) are mirror images.

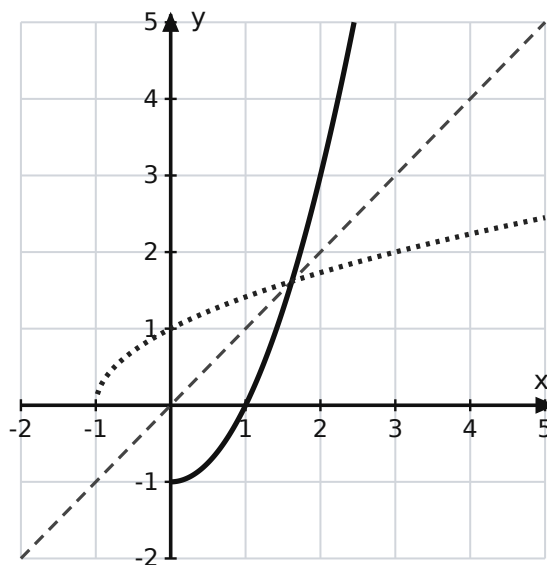
Swapping coordinates gives (3,4).

$$x = \frac{y}{2} + 1 \text{ gives } y = 2x - 2.$$

$$(3, 4); f^{-1}(x) = 2x - 2$$

Scoring: 1 point for the point, 1 point for the inverse.

Question 8 - Restricted domain [2 pts]



Inverse: $\sqrt{x + 1}$.

$$x = y^2 - 1, \text{ so } y = \sqrt{x + 1} \text{ (nonnegative because } x \geq 0 \text{ originally).}$$

Domain: $x \geq -1$.

$$f^{-1}(x) = \sqrt{x+1}, x \geq -1$$

Scoring: 1 point for the inverse, 1 point for the domain.

Question 9 - Find the error [2 pts]
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$$f(g(x)) = 2x+1 \text{ but } g(f(x)) = 2(x+1) = 2x+2.$$

$2x + 1$ is not equal to $2x + 2$

Scoring: 1 point for each composition.

Total
20 points