

Worksheet on Transformations of Exponential Functions

Multiple Choice

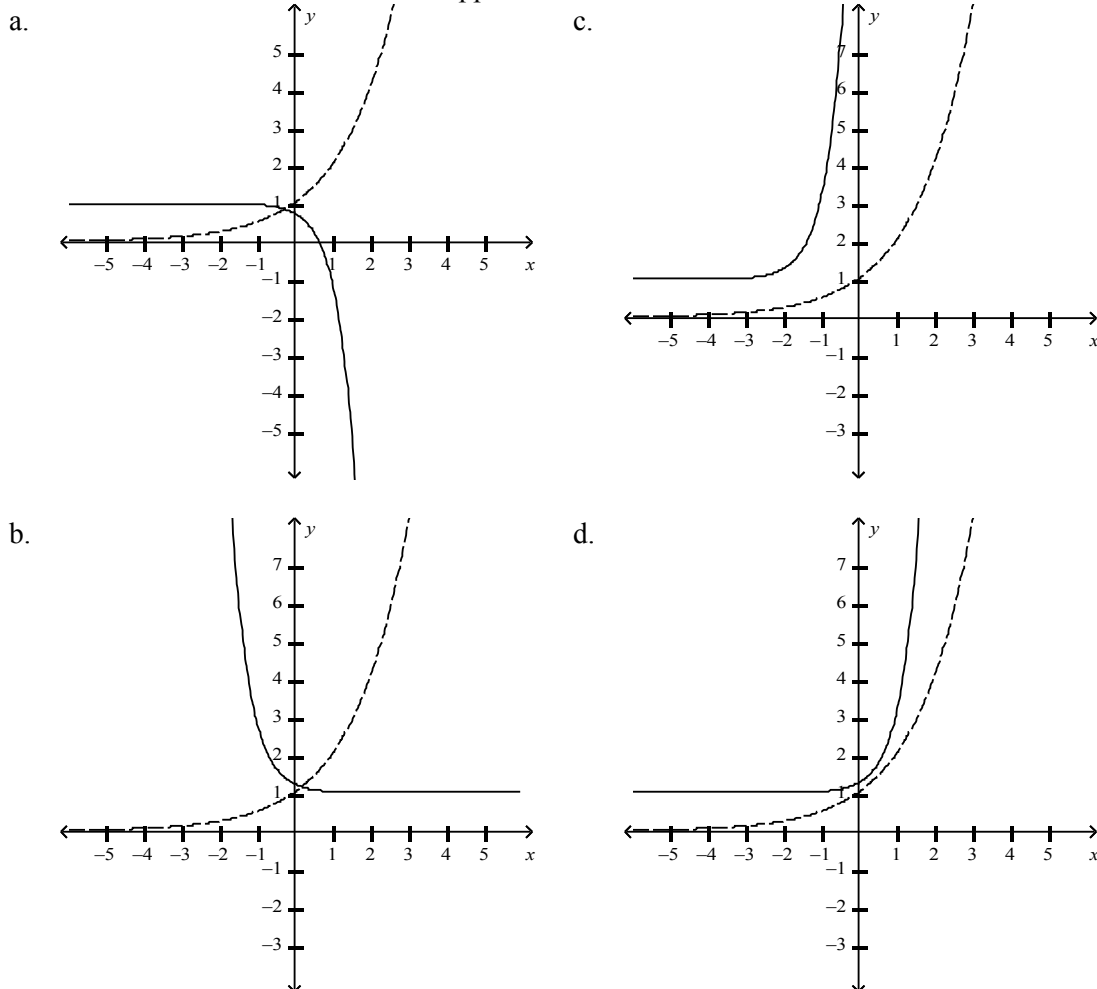
Identify the choice that best completes the statement or answers the question.

- _____ 1. Which of the following functions represents $f(x) = 9^x$ after a reflection on the x -axis and a vertical translation 5 units down?

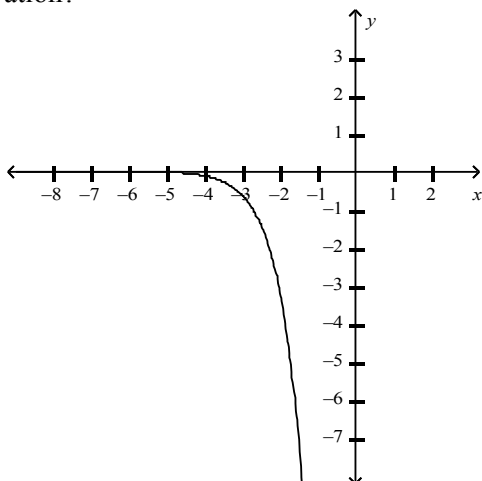
a. $g(x) = -(9^{x-5})$ c. $g(x) = -(9^x) - 5$
 b. $g(x) = 9^{-x+5}$ d. $g(x) = -(9^x) + 5$

- _____ 2. What is the equation of the asymptote for the function $f(x) = 0.5(4^{x-2}) + 3$?
- a. $y = 3$ c. $x = 3$
 b. $y = -3$ d. $y = 4$

- _____ 3. Consider the function $f(x) = 2(2^{3x-3}) + 1$. Which of the following graphs represents the base function as a dotted curve and the transformations applied to the base function as a solid curve?



- _____ 4. Which of the following functions represents $f(x) = 8^x$ after a vertical compression by the factor $\frac{1}{4}$ and a reflection on the y-axis?
- a. $g(x) = \frac{1}{4} \left(8^{-x} \right)$ c. $g(x) = 8^{-\frac{1}{4}x}$
- b. $g(x) = -\frac{1}{4} \left(8^x \right)$ d. $g(x) = - \left(8^{4x} \right)$
- _____ 5. The graph shown represents a transformation of the function $f(x) = 5^x$. What is the equation for the transformation?



- a. $g(x) = 3 \left(5^{x+2} \right)$ c. $g(x) = 3 \left(5^{x-2} \right)$
- b. $g(x) = -3 \left(5^{x-2} \right)$ d. $g(x) = -3 \left(5^{x+2} \right)$

Short Answer

6. Use transformations to sketch the function $y = -3 \left(2^{x+6} \right) - 1$. State the domain and range.
7. Compare and contrast the functions $f(x) = 8^x$ and $g(x) = 2^{3x}$.

8. The function $g(x) = -2(3^{2x-6}) + 9$ is the result of transformations of $f(x) = 3^x$. Describe the sequence of transformations.

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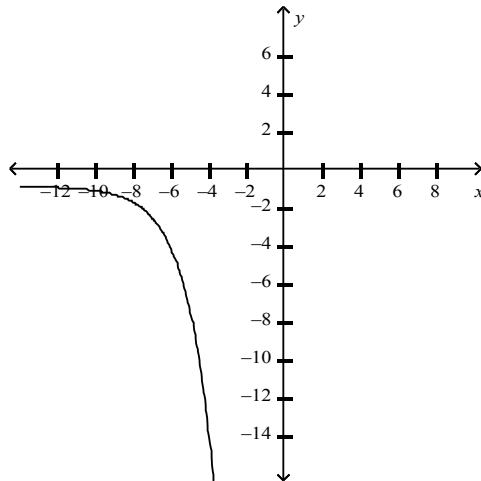
Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Transformations of Exponential Functions
2. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Transformations of Exponential Functions
3. ANS: D PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Transformations of Exponential Functions
4. ANS: A PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Transformations of Exponential Functions
5. ANS: D PTS: 1 REF: Knowledge and Understanding
OBJ: 4.6 - Transformations of Exponential Functions

SHORT ANSWER

6. ANS:



Domain = $\{x \in \mathbf{R}\}$

Range = $\{y \in \mathbf{R} \mid y < -1\}$

PTS: 1 REF: Knowledge and Understanding

OBJ: 4.6 - Transformations of Exponential Functions

7. ANS:

Both functions are the same. Eight is a power of 2, so, to make it easier to compare 8^x with 2^{3x} , I substituted 2^3 for 8 in the first equation.

$$f(x) = 8^x$$

$$f(x) = \left(2^3\right)^x$$

$$f(x) = 2^{3x}$$

$$f(x) = g(x)$$

PTS: 1

REF: Communication

OBJ: 4.6 - Transformations of Exponential Functions

8. ANS:

There is a vertical stretch by a factor of 2 and a reflection in the x -axis. There is a horizontal compression by a factor of $\frac{1}{2}$. There is a translation 3 units to the right and 9 units up.

PTS: 1

REF: Communication

OBJ: 4.6 - Transformations of Exponential Functions