Homework 3.2 Transformations of Exponential Functions

Describe the transformations that map the function $f(x) = 2^x$ onto each of the following functions. In addition, in each problem identify the point where the exponential starts and whether it is a growth or decay.

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

2. $f(x) = -2^{x+3}$

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

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

Write the function that results from each transformation applied to the base function of $f(x) = 5(6^x)$.

5. Translate down 3 units & reflection across x-axis

$f(x) =$

6. Shift right 2 units and reflection across y-axis

$f(x) =$

7. Shift left 5 & down 8 units

$f(x) =$

Shift up & left 2.3; reflection across x-axis

$f(x) =$

Sketch the following functions on the provided graphs below.

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

10. $f(x) = 3(2^{x-1}) + 2$

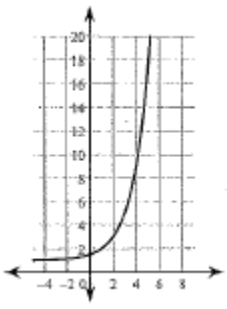
11. $f(x) = 3(4^{x+3}) - 2$

12. $f(x) = 3(2^{x-4}$

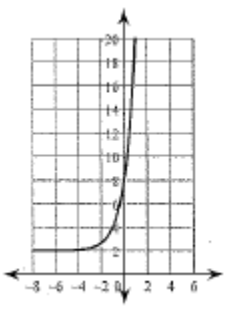
Circle the correct graph that represents the function highlighted.

13. $f(x) = 2(2^{x-2}) + 1$

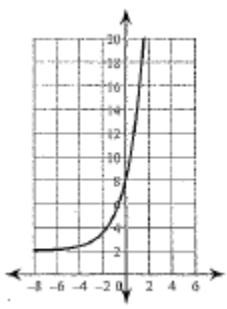
A



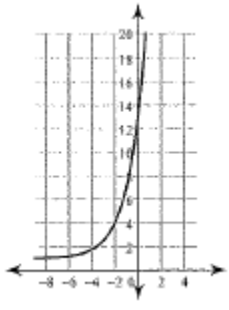
B



C

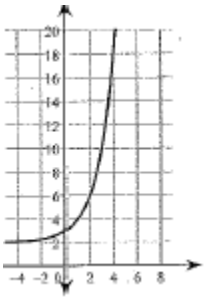


D



14. $f(x) = 2(2^{x+1}) - 1$

A



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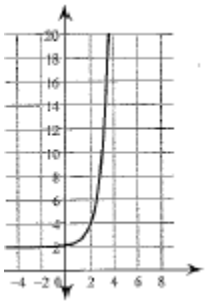

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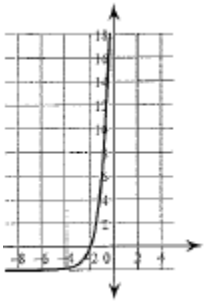

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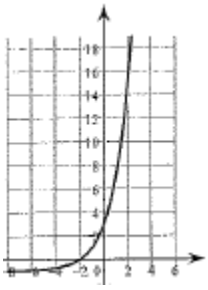
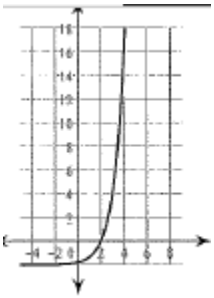


15. $f(x) = 3(2^{x-2}) - 2$

A



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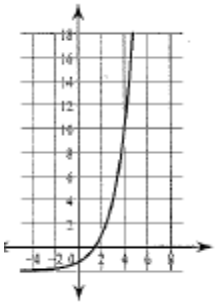

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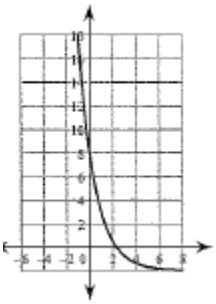

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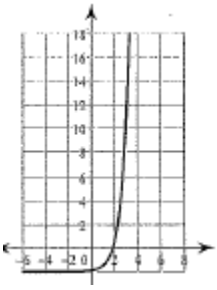
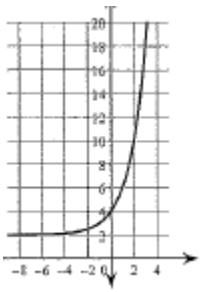


16. $f(x) = 2(\frac{1}{2}^{x+2}) + 2$

A



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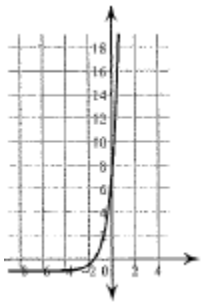

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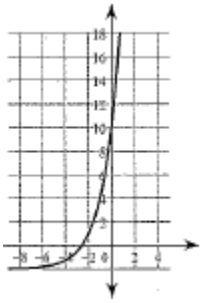

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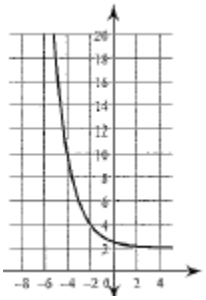
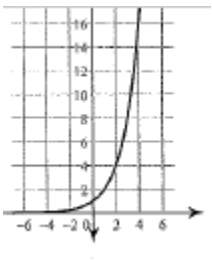


17. $f(x) = (3^x)$

A



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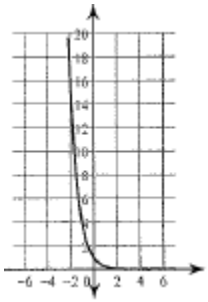

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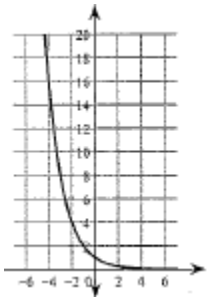

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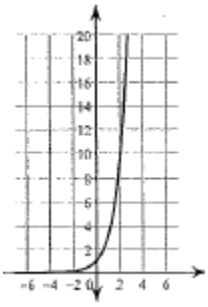
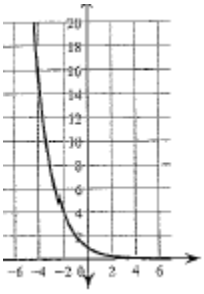


18. $f(x) = (\frac{1}{3}^x)$

A



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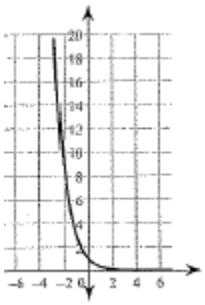

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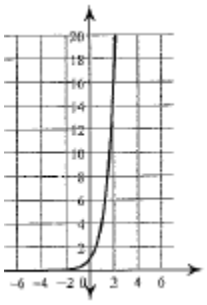

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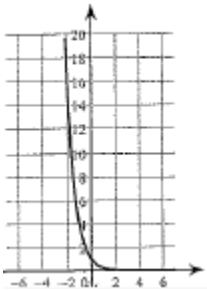
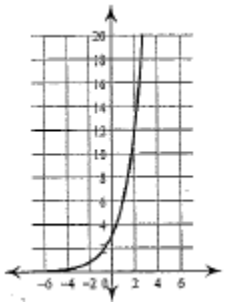


19. $f(x) = \frac{1}{4}(6^x)$

A



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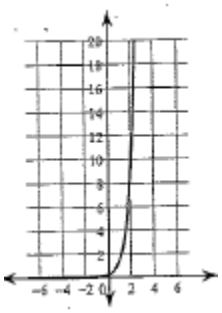

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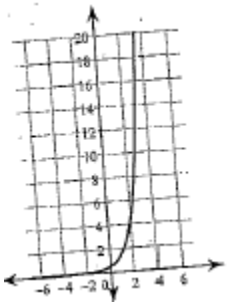
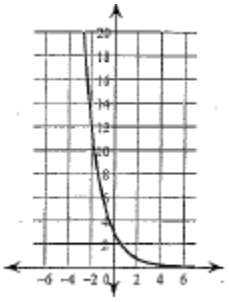
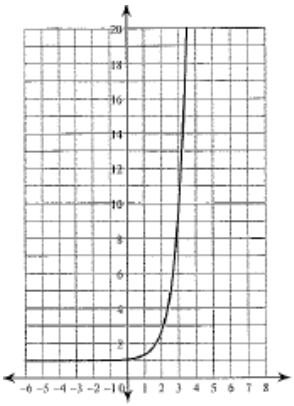


D



Circle the function that represents the graph given.



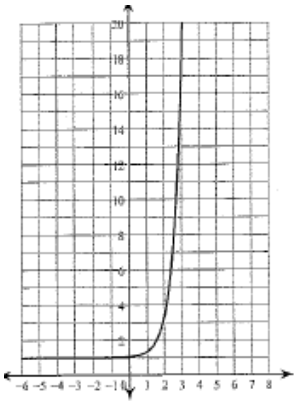
20.

A. $f(x) = \frac{1}{3}(5^{x-1}) + 1$

B. $f(x) = \frac{1}{2}(4^{x+1}) + 2$

C. $f(x) = 4(\frac{1}{2}^{x+1}) + 2$

D. $f(x) = 2(2^{x+1}) + 2$



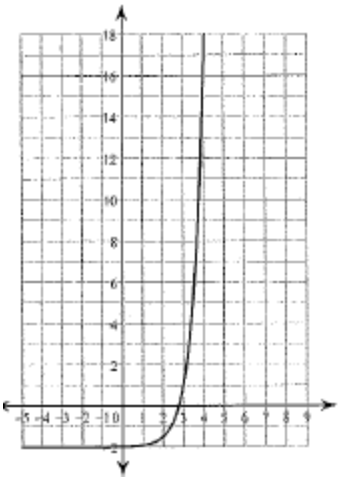
21.

A. $f(x) = \frac{1}{4}(\frac{1}{3}^{x-1}) + 1$

B. $f(x) = \frac{1}{3}(7^{x+1}) - 1$

C. $f(x) = \frac{1}{3}(7^{x-1}) + 1$

D. $f(x) = \frac{1}{3}(\frac{1}{4}^{x-1}) - 1$



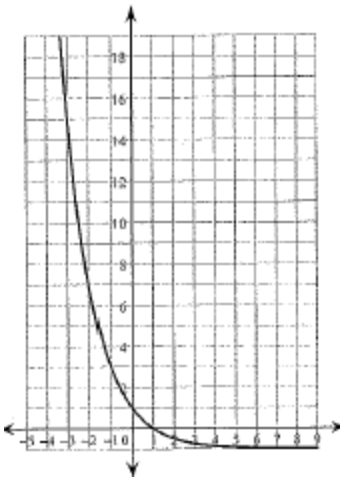
22.

A. $f(x) = 2(4^{x-2}) - 1$

B. $f(x) = \frac{1}{2}(6^{x-2}) - 2$

C. $f(x) = 4(2^{x-1}) - 2$

D. $f(x) = 4(2^{x-2}) - 2$



23.

A. $f(x) = 5(2^{x+1}) + 1$

B. $f(x) = 6(\frac{1}{3}^{x-2}) + 1$

C. $f(x) = \frac{1}{3}(6^{x-2}) + 1$

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

3.2 Answers

1 starts at (0, 1); shifts down 2 units; growth 2 reflection across x-axis; starts at (0, 1); shifts left 3 units; growth 3 reflection across x-axis; starts at (0, 3); shifts right 1 unit; shifts up 1 unit; growth 4 starts at (0, 2); reflection across y-axis, shift left 2 units, shift down 1 unit 5 $f(x) = -(5)(6)^x - 3$ 6 $f(x) = (5)\left(\frac{1}{6}\right)^{x-2}$ 7 $f(x) = (5)(6)^{x+5} - 8$ 8 $f(x) = -(5)(6)^{x+2.3} + 2.3$ 9 - 12 Get answers from teacher if needed 13 A 14 D 15 B 16 D 17 D 18 B 19 B 20 A 21 C 22 B 23 D