Test # 3 Exponential Functions PRACTICE TEST

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Name: _____

1. Fill in the blanks. [5 marks]

a) The range of $y= -(3)^{x+2} - 5$ _____ b) The asymptote of $y = 3\ (2)^{x-1} +1$ _____

c) Exponential growth or decay for $f(x) = 4\ (0.50)^x$ _____

d) For the function $f(x) = -3\ (4)^x$, what is the y-int: _____ x-int: _____

2. Write the equation of the new function that has the base $f(x)= 2^x$ that has been reflected in the y-axis, vertically stretched by 3, horizontally compressed by 4 and shifted right 3 and up 7.
[2]

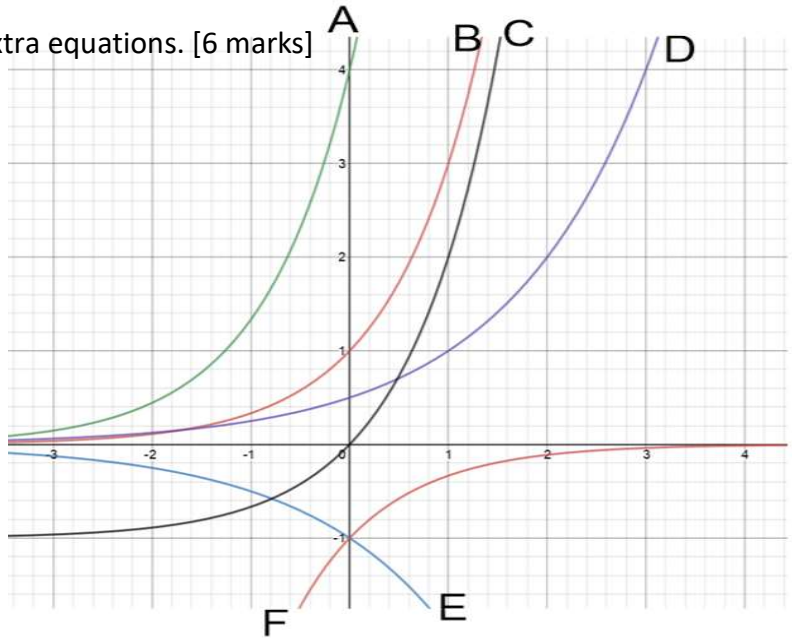
3. Simplify. Express each answer with positive exponents. [17]

a) $\frac{15x^2y^{-5}}{3x^5y^{-3}}$ b) $\frac{3x^{-2}}{y^0}$ c) $\sqrt[3]{-125x^{12}}$

d) $\frac{(2^{-3}x^5y^2)^{-4}}{64x^8y^{-8}}$ e) $\left(\frac{2x^2}{y^{-3}}\right)^{-2}$ f) $\sqrt[3]{\sqrt{2x^9}}$

g) $\frac{3^{-2}+3}{3^{-2}-3^0}$ h) $\frac{\sqrt{m(m^{2k+1})}}{\sqrt[4]{m^{4k}}}$ i) $\left(\sqrt{144x^{16}y^{-2}}\right)^3$

4. Match the graph with the equation. There are extra equations. [6 marks]



$y = 3^x$ _____ $y = 2^x$ _____

$y = -2^x$ _____ $y = -\left(\frac{1}{3}\right)^x$ _____

$y = \left(\frac{1}{3}\right)^x$ _____ $y = 3^{x-2}$ _____

$y = 3^x - 1$ _____ $y = 4(3)^x$ _____

$y = \frac{1}{2}(2)^x$ _____

5. Solve the following exponential equations using exponent laws. Show all steps for full marks. [8]

a) $2(3^{x-5}) - 1 = 53$

b) $\frac{8^{x+4}}{4^{x+3}} = 1$

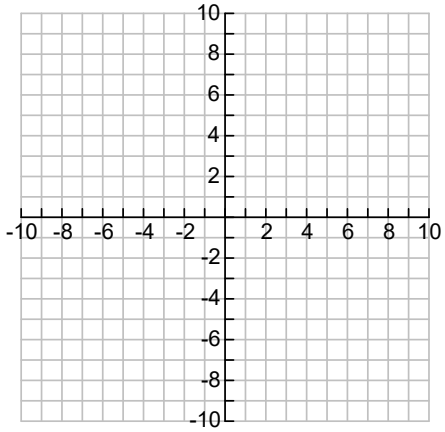
c) $5^{x+3} - 5^{x+2} = 12\,500$

6. Explain why $g(x) = \frac{1}{8}(2)^x$ has a horizontal translation to the right by 3 units from $f(x) = 2^x$

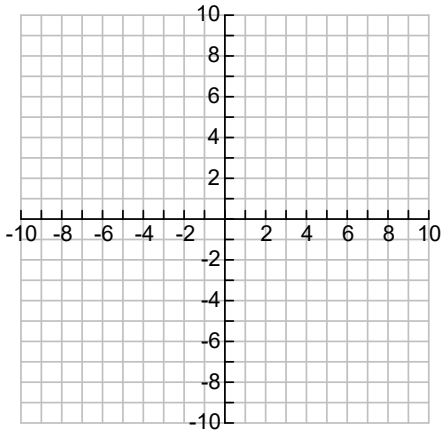
[2]

7. State the transformations in order and graph each of the following. Label points as needed.

a) $f(x) = \left(\frac{1}{3}\right)^{x+3} - 4$



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



[6]

8. Write the equation that models each situation. Define the variables in each. **Do not solve.**

a) An initial population of grade 9 students is 365 but each year the population decreases by 18%.

b) A colony of bacteria doubles in number every 40 minutes. The initial population of the colony is 22 bacteria.

[2]

9. A 200 g sample of Mes-Pertium decays to 12.5 g in 24 h. What is the half-life of this radioactive isotope?

[3]

10. The population of Mathville in 2003 is 27,000. What is the annual growth rate of Mathville if the population is 252, 656 in 2019?

[3]