

Pre-Test Unit 4: Exponential Functions

You may use a calculator on parts of the test.

Evaluate the following rational roots. **NO CALCULATOR.** (4 pts; 2 pts for correct process, 2 pts for correct answer)

1. $16^{\frac{3}{4}}$

2. $125^{\frac{2}{3}}$

Determine if the following statements are true or not. Justify your answer. **NO CALCULATOR.** (4 pts; 2 pts for correct answer, 2 pts for justification)

3. $x^{\frac{3}{7}} = \sqrt[7]{x^3}$

4. $y^{\frac{8}{3}} = \sqrt[8]{y^3}$

Determine the appropriate value to make the equation true. Justify your answer. **NO CALCULATOR.** (4 pts; no partial credit)

5. $z^{\frac{5}{6}} = \sqrt[6]{z^5}$

6. $64^{\frac{3}{8}} = 2^{\boxed{?}}$

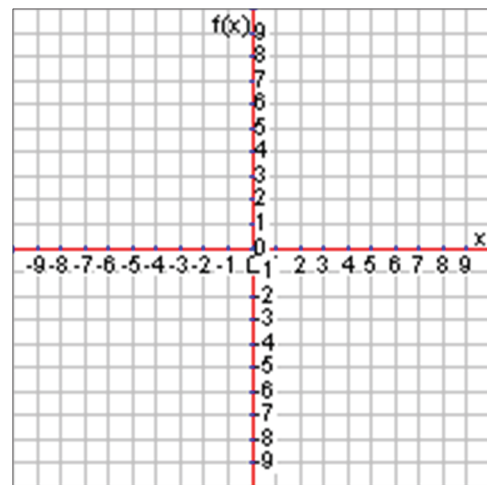
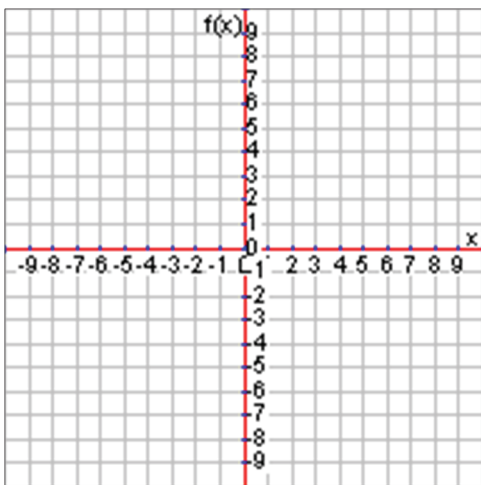
Graph the following functions by filling out the tables. **NO CALCULATOR.** (4 pts; 2 pts for correct table, 2 pts for graph correctly based on table)

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

x	1	2	3	4	5
$f(x)$					

8. $f(x) = \left(\frac{1}{2}\right)^x - 7$

x	-2	-1	0	1	2
$f(x)$					



Find the average rate of change over the interval $[-2, 2]$ for the following functions. **YOU MAY USE A CALCULATOR.** (4 pts; no partial credit)

9. $f(x) = 2^{x+2} - 7$

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

Describe the transformation that would take place given the parent function $f(x) = 2^x$. **YOU MAY USE A CALCULATOR.** (4 pts; partial credit at teacher discretion)

11. $f(2x)$

12. $f(x + 3)$

13. $4 * f(x)$

14. $f(x) - 5$

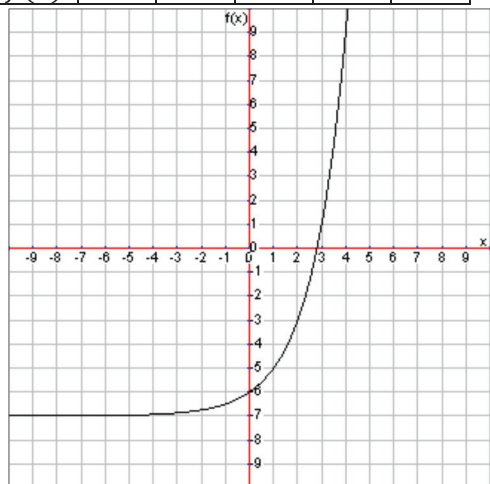
15. $g(x) = 2^{-x}$

16. $g(x) = -2^x$

Create an equation for the following graph, table, or situation. **YOU MAY USE A CALCULATOR.** (4 pts; partial credit at teacher discretion)

17.

x	0	1	2	3	4
$f(x)$	-6	-5	-3	1	9



18. A woman invests \$10,000 at a compound interest rate of 2%.

Answer the following questions about the function $p(t) = 500(0.97)^t$. YOU MAY USE A CALCULATOR. (4 pts; no partial credit)

19. If the function $p(t)$ models the population of an endangered species after t years, what is their current population and growth rate? (2 pts each)

20. What would we expect their population to be in 10 years to the nearest whole number?

21. What was their approximate population 10 years ago to the nearest whole number?

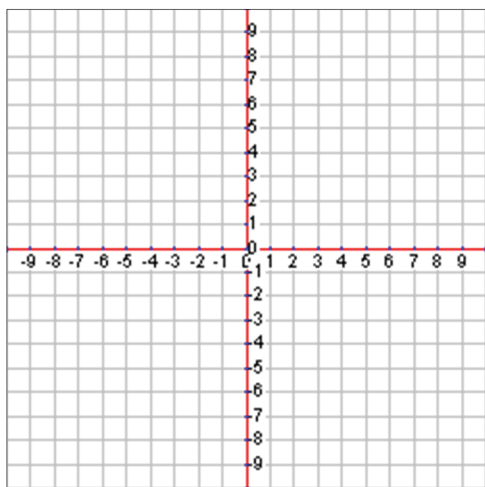
Charleston has a population of about 11,000 people (not counting college students) and is growing at a rate of about 0.5%. Mattoon's population change can be modeled by the following function $m(t) = 18000(0.99)^t$ after t years. Answer the following questions. YOU MAY USE A CALCULATOR. (4 pts; no credit without explanation)

22. Which city has the higher growth rate and how do you know?

23. Which city has the higher initial value and how do you know?

Solve the following system of equations. You may graph the functions if that will help. YOU MAY USE A CALCULATOR. (4 pts; 2 pts for each solution when there are two solutions)

24. $f(x) = 2^{x-4} - 5$
 $g(x) = -2x + 7$



25. $f(x) = \left(\frac{1}{2}\right)^{x-2} - 4$
 $g(x) = -\frac{3}{2}x$

