Ch. 10 Book Review Pg.

Chapter 10 Test Review

For Exercises 1–6, fill in the blank.

1. For the exponential function $y = 3 \cdot 2^x$,
 a. 3 is called the initial value
 b. 2 is called the base.

2. The product of a coefficient and one or more variables raised to non-negative powers is called a(n) monomial.

3. If the value of a function approaches the number k as x gets very large or very small, the line $y = k$ is a horizontal asymptote.

4. A function of the form $y = ab^x$ with $b > 1$ models exponential growth.

5. A function of the form $y = ab^x$ with $0 < b < 1$ models exponential decay

6. A function of the form $y = ab^{-x}$ with $b > 1$ models exponential decay

7. You are given a table of data relating two variables. The independent variable increases at a constant rate. Explain how you can tell if
 a. a linear function is a good model for the data.
 b. an exponential function is a good model for the data.

(a) The rate of change (slope) of the dependent variable is constant
(b) The successive ratios of the dependent variable is constant!

For Exercises 8–12, simplify the expression. Write your answer with positive exponents only.

8. $(y^3)(y^9)$

9. $\frac{t^8}{t^2}$

10. $3d^{-4}$

11. $\left(\frac{2p^4q^2}{\cancel{q^{-2}}r^5}\right)^3$

12. $\frac{4a^3bc^{-5}}{12a^5b^{-4}c^2}$

(8) y^{12} (9) t^6 (10) $\frac{3}{d^4}$ (11) $\frac{2^3p^{12}q^6}{r^{15}}$ $\frac{8p^{12}q^6}{r^{15}}$

(12) $\frac{4a^3bb^4}{12a^5c^5c^2} = \frac{b^5}{3a^2c^7}$

13. Write 0.0000000025 in scientific notation. 2.5×10^{-9}

14. The diameter of the period at the end of this sentence is about 3×10^{-2} centimeter. Write this length using standard notation. .03

15. The population of a town has been increasing as shown in the table.

	Year	Population	Successive Quotients
0	1970	6,451	
1	1980	7,423	$\frac{7423}{6451} = 1.15$
2	1990	8,548	$\frac{8548}{7423} = 1.15$
3	2000	9,814	$\frac{9814}{} = 1.15$

2	1990	8,548
3	2000	9,814
4	2010	11,280

$\frac{8548}{7423} = 1.15$

$\frac{9814}{8548} = 1.15$

$\frac{11280}{9814} = 1.15$

a. If the pattern continues, find a function that models the population P of the town in terms of the number n of decades after 1970.

$P = 6{,}451(1.15)^n$

b. If the pattern continues, predict the town's population in 2030.

year 6

$P = 6{,}451(1.15)^6$

$P \approx 14{,}922$

16. Suppose you take a sheet of $8\frac{1}{2}$-inch by 11-inch paper and fold it in half, then fold in half again, and continue to repeat the process.

a. Find an equation that describes the area of the top surface of the folded paper as a function of the number of folds

b. What will the area be after the 6th fold?

a) $y = a \cdot b^x$ so $y = 93.5(\frac{1}{2})^x$

b) $y = 93.5(\frac{1}{2})^6 = 1.46 \text{ in}^2$

w, l: $A = l \cdot w$ so $8.5 \cdot 11 = 93.5$

w, ½l: $A = \frac{1}{2} l \cdot w$ so $\frac{1}{2} \cdot 93.5$

½w, ½l: $A = \frac{1}{2} \cdot \frac{1}{2} \cdot l \cdot w$ $(\frac{1}{2})^2 \cdot 93.5$

17. A ball is dropped from a height of 200 centimeters. The table shows the height of the ball after each of the first 4 bounces.

Number of Bounces	Height (cm)
0	200
1	150
2	112.5
3	84.4
4	63.3

$\frac{150}{200} = .75$

$\frac{112.5}{150} = .75$

$\frac{84.4}{112.5} = .75$

$\frac{63.3}{84.4} = .75$

a. If the pattern continues, write an equation that gives the height of the ball h after n bounces.

$y = a \cdot b^x$

$y = 200(.75)^x$

b. Use your equation to predict the height of the ball after the 7th bounce.

$y = 200(.75)^7$

$y \approx 26.7$ cm

18. The moose population in a state park in 2005 was 27. In 2010 the moose population had grown to 42.

a. If the growth is caused only by migration, the yearly change in the number of moose can be assumed to be constant. In that case, write an equation that models the number of moose M in the park as a function of time t (in years) beginning in 2005.

a)

	t	M
0	2005	27
5	2010	42

$y = mx + b$

$m = \frac{42-27}{5-0}$

$m = 3$

$\boxed{M = 3t + 27}$

b. Use your equation from Part (a) to predict the number of moose in the park in 2020 if the same pattern continues.

b) $M = 3(15) + 27$

$M = 45 + 27$

$M = 72$ moose

c. On the other hand, if the growth is solely due to reproduction, the population would have grown by 9.24% each year from 2005 to 2010. Find a model for the moose population in that case. $1 + .0924$

c) $M = 27(1.0924)^t$

d. Use your equation from Part (c) to predict the number of moose in the park in 2020.

d) $M = 27(1.0924)^{15}$

$M \approx 102$ moose