Unit 4 Comprehensive Review – Version 2

Directions: Show all work. Use exact values. Box or circle all answers.

Section A – Geometric Sequences and Growth/Decay

1. Find the common ratio and write the next three terms: $2, 8, 32, 128, \ldots$

2. Find the common ratio and write the next three terms: $243, 81, 27, 9, \ldots$

3. Determine whether the sequence is geometric. If it is, find the common ratio: $64, -32, 16, -8, \ldots$

4. Determine whether the sequence is geometric. If it is, find the common ratio: $4, 12, 36, 100, \ldots$

5. A geometric sequence has $a_1 = 3$ and common ratio $r = -2$. Write the first 5 terms.

6. A geometric sequence has $a_1 = 625$ and common ratio $r = \frac{1}{5}$. Write the first 5 terms.

7. A geometric sequence has $a_1 = 2$ and $r = 3$. Find a_7.

8. A geometric sequence has $a_1 = 96$ and $r = \frac{1}{2}$. Find a_6.

9. A quantity is 5 at the end of round 1 and triples each round. find the value at the end of 5 rounds.

10. A quantity is 32 at the end of day 1 and increases by 50% each day. State the common ratio and find the value at the end of 5 days.

11. A quantity is 2560 at the end of year 1 and decreases by 25% each year. State the common ratio and find the value at the end of 4 years.

12. A quantity is 1600 at the end of hour 1 and is cut in half each hour. State the common ratio and find the value at the end of 6 hours.

Section B – Recursive Formulas

13. Write a recursive formula to represent the sequence $4, 20, 100, 500, ...$

14. Write a recursive formula to represent the sequence $162, 54, 18, 6, ...$

15. Write a recursive formula to represent the sequence $3, -6, 12, -24, ...$

16. Write the first 6 terms of the sequence if $a_1 = 2,\ a_n = 4a_{n-1}$.

17. Write the first 5 terms of the sequence if $a_1 = 125,\ a_n = \frac{1}{5}a_{n-1}$.

18. Write the first 5 terms of the sequence if $a_1 = 6,\ a_n = -3a_{n-1}$.

19. The table shows the number of people reached at the end of each round.

Round	1	2	3	4
People	8	24	72	216

Find the common ratio and write a recursive formula to model the situation. Do not forget to include the first term.

20. The table shows the mass of a sample at the end of each day.

Day	1	2	3	4
Mass	6400	1600	400	100

Find the common ratio and write a recursive formula to model the situation. Do not forget to include the first term.

21. A quantity has 40 at the end of hour 1 and increases by 50% each hour. Write a recursive formula.

22. A quantity has 3200 at the end of year 1 and decreases by 25% each year. Write a recursive formula.

23. A quantity has 7 at the end of round 1 and quadruples each round. Write a recursive formula.

24. A sequence has recursive formula $a_1 = 125,\ a_n = \frac{1}{5}a_{n-1}$. What is the common ratio? Write the first 5 terms.

Section C – Explicit Formulas and Exponential Models

25. Write an explicit formula for the geometric sequence $3, 9, 27, 81, ...$

26. Write an explicit formula for the geometric sequence $1024, 256, 64, 16, \ldots$.

27. Write an explicit formula for the geometric sequence $6, -12, 24, -48, \ldots$.

28. Convert the recursive formula to an explicit formula: $a_1 = 4,\ a_n = 5a_{n-1}$.

29. Convert the recursive formula to an explicit formula: $a_1 = 128,\ a_n = \frac{1}{2}a_{n-1}$.

30. Convert the explicit formula to a recursive formula: $a_n = 9(4)^{n-1}$. Include the first term.

31. Convert the explicit formula to a recursive formula: $a_n = 81(-\frac{1}{3})^{n-1}$. Include the first term.

32. The table shows the number of points earned in rounds 1 through 4.

Round	1	2	3	4
Points	5	20	80	320

Find the common ratio, write an explicit formula, and find the value at 6.

33. The table shows the mass of a sample for days 1 through 4.

Day	1	2	3	4
Mass	729	243	81	27

Find the common ratio, write an explicit formula, and find the value at 6.

34. A geometric sequence has $a_3 = 12$ and $a_6 = 96$. Find the common ratio and write an explicit formula for the sequence.

35. A geometric sequence has $a_2 = 32$ and $a_5 = 4$. Find the common ratio and write an explicit formula for the sequence.

36. For $y = f(x) = (800)(1.15)^x$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

37. For $y = f(x) = (600)(0.6)^x$, identify the y-intercept and common ratio. At what percentage is the function growing or decaying? Is it growth or decay?

38. A population has 128 when the situation begins and increases by 25% each period. Write an exponential equation to model the quantity at any given time. Find the value after 3 periods.

39. A machine value has 2000 when the situation begins and decreases by 25% each period. Write an exponential equation to model the quantity at any given time. Find the value after 2 periods.

40. y-intercept = 5; common ratio = 4. Write an explicit equation for the exponential function.

41. y-intercept = -6; common ratio = $\frac{2}{3}$. Write an explicit equation for the exponential function.

42. Point: $(1, 20)$; common ratio = $\frac{1}{2}$. Write 2 different explicit equations that represent the same exponential function.

43. Point: $(4, 81)$; common ratio = 3. Write 3 different explicit equations that represent the same exponential function.

44. Point: $(3, 24)$; common ratio = 2. Write 3 different explicit equations that represent the same exponential function.

Section D – Solving Basic Exponential Equations

45. Solve $3^x = 243$.

46. Solve $2^x = \frac{1}{32}$.

47. Solve $4^x = 1024$.

48. Solve $5^x = \frac{1}{625}$.

49. Solve $4^{2x-1} = 64$.

50. Solve $3^{3x+2} = 2187$.

51. Solve $2^{x+4} = 128$.

52. Solve $5^{4x-2} = 5^{x+7}$.

53. Solve $2^{7x+1} = 2^{3x+13}$.

54. Solve $3 \cdot 2^{x} = 192$.

55. Solve $6 \cdot 5^{x-1} = 150$.

56. Solve $4 \cdot 3^{2x} = 2916$.