Algebra 1 Benchmark 3 Review

1. Write $\sqrt[4]{16}$ using rational exponents.

2. What is the solution of $5^{y+1} = 5^{4y-2}$?

3. Which exponential function is represented by the table below?

x	1	2	3	4
y	-2	-12	-72	-432

4. Identify the key features of the graph of the exponential function $f(x) = 7^x$.

   The domain: The range:

   The equation of the asymptote: The y-intercept:

5. A company is tracking the number of employees who remain at the company after an annual review process. The number of employees follows an exponential decay model. The company will need to restructure if the number of employees falls below 100 by Year 8. Two points on the graph are (0, 500) and (1, 425).

Employee Retention Over Time
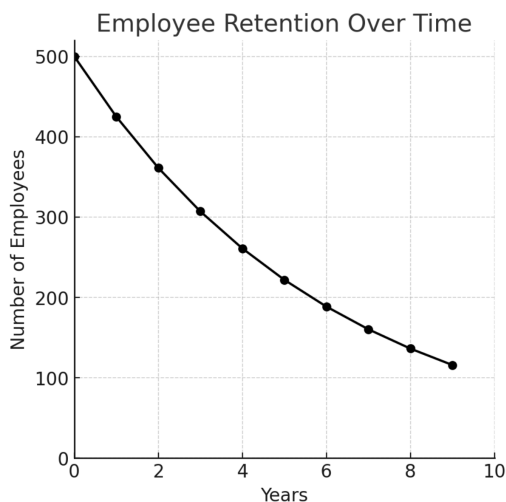
Use the given information to write an exponential function that models the situation. If this trend continues, will the company need to restructure?

What is the exponential function that models the situation?
A) $f(x) = 500(0.85)^x$
B) $f(x) = 500 \cdot 0.85^8$
C) $f(x) = 0.85(500)^x$
D) $f(x) = 500(0.8)^x$

Will the company need to restructure?

6. Which of the following is an arithmetic sequence?

A) 3, 6, 12, 24, 48, …

B) 10, 7, 4, 1, -2, …

C) 2, 4, 8, 16, 32, …

D) 5, 10, 20, 35, 55, …

7. Jake uploaded a funny video online which goes viral. The number of views grows exponentially each day. Initially, on the first day, he had 50 views, and the number of views tripled every day. Write an exponential function to model the number of views each day. How many views will he have by the 10th day?

8. Find the common ratio of the following geometric sequence and write a function for it:

    3, 6, 12, 24, 48, 96, …

9. Add or Subtract the polynomials.

    (a) $\left(x^2 + 3x - 10 \right) + \left(8 - 4x + 5x^2 \right)$

    (b) $\left(4x^3 + 2x - 1 \right) - \left(2x^3 - 3x + 4 \right)$

10. Multiply the polynomials.

    (a) $2x(2x^2 - x + 5)$

    (b) $(2x - 1)(x - 8)$

    (c) $(5y - 2)(5y + 2)$

    (d) $(x^2 - 2x)(3x^2 - 5x + 7)$

11. Identify the GCF.

    a) $9xy^3z^4$ and $12x^2yz^3$

    b) $14a^2b^5$ and $35ab^3$

12. Factor the polynomials.

a) $6x^3 - 24x^2 - 18x$

b) $x^2 + x - 42$

c) $x^2 + 12x + 36$

d) $2x^2 - 7x - 15$

e) $8x^2 - 14x - 15$

f) $x^2 - 81$

g) $9x^2 - 100$

h) $16a^2 - 81$

13. A rectangular billboard has an area of $x^2 + 5x + 6$. Factor it to find the expressions for the length and width of the billboard.