

- Write an expression equivalent to $\left(\frac{c^{22}}{c^8}\right)$ in the form c^m .
 c^{22-8}
 c^{14}
Common misconceptions
Students might lose track of exponents, skipping over or forgetting signs. Having students write each step can help them with precision.
- Write an expression equivalent to $(h^2h^4j^6)^3$ in the form $h^m j^n$.
 $(h^{2+4}j^6)^3$
 $(h^6j^6)^3$
 $h^{18}j^{18}$
- Write an expression equivalent to $(-6x^2y)(-2x^3y^2)$ in the form $Ax^m y^n$.
 $12x^{2+3}y^{1+2}$
 $12x^5y^3$
- For each statement, select True or False. $\sqrt[3]{x^4}$ is equivalent to... $\rightarrow \sqrt[4]{x^3}$
A) $\sqrt{x^4}$ True False B) $\sqrt[4]{x}$ True False
C) $\sqrt[3]{x^4}$ True False D) $\sqrt[4]{x^3}$ True False
- For each statement, select True if the equation is true for all values of x, otherwise, select False.
A) $2^{10x} = 20x$ True False $2^{10(1)} > 20(1)$ B) $3^{3x} = 27^x$ True False
 $3^{3x} = (3^3)^x \checkmark$
C) $81^x = 3^{4x}$ True False $81^x = (3^4)^x = 3^{4x} \checkmark$ D) $6^{2x} = 2^{6x}$ True False
 $6^{2(1)} < 2^{6(1)}$

Part B: Graphing & Key Features of Exponential Functions [F-IF.4, F-IF.7]

6. Determine if the function models exponential growth or exponential decay, construct a graph of the function, and label its key features including intercepts and end behavior.

$f(x) = \left(\frac{2}{3}\right)^x$

This function models exponential decay.

x	f(x)
0	1
1	$\frac{2}{3}$
2	$\frac{4}{9}$
3	$\frac{8}{27}$

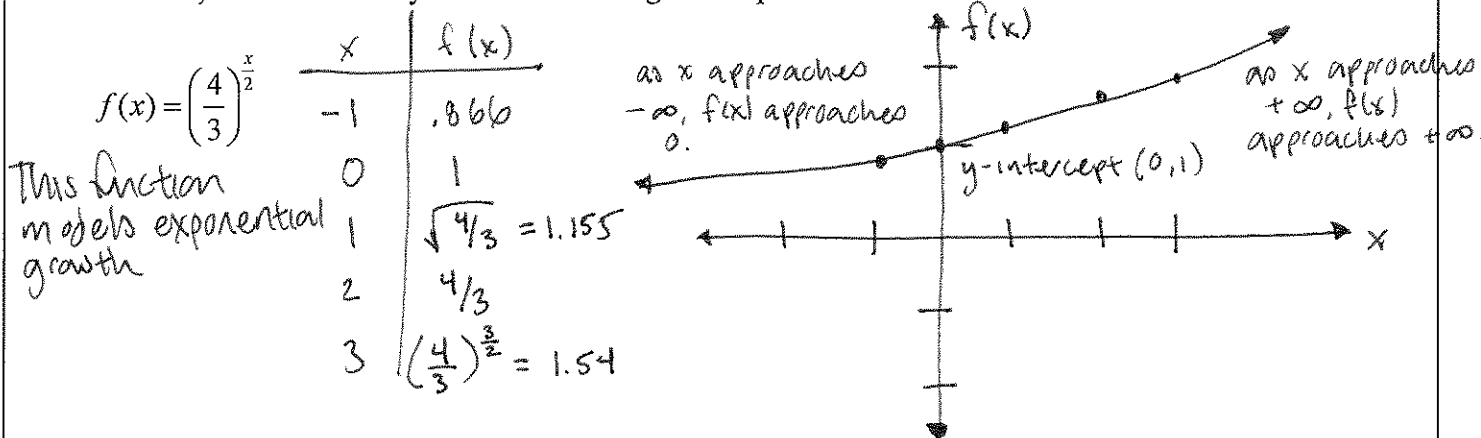
as x approaches $-\infty$, f(x) approaches ∞ .

y-intercept (0,1)

as x approaches $+\infty$, f(x) approaches 0.

Common misconceptions
Students might misapply the exponent to the rational base or attribute growth/decay to the sign of the exponent.

7. **Determine** if the function models exponential growth or exponential decay, **construct** a graph of the function, and **label** its key features including intercepts and end behavior.



Part C: Working with Exponential Functions [A-CED.1, A-CED.2, F-BF.3]

8. A new medicine has a biological half-life of 3 hours, meaning it takes the body 3 hours to remove one-half of the total amount of the medicine currently present in the system. **Determine** which statement about the amount of medicine in a person's system is correct.

x time	f(x) mg	
0	800	A) Of an 800 mg dose, 400 mg will still be present in a person's system 9 hours after the dose is taken.
3	400	B) Of an 800 mg dose, 200 mg will still be present in a person's system 9 hours after the dose is taken.
6	200	C) Of an 800 mg dose, 100 mg will still be present in a person's system 9 hours after the dose is taken.
9	100	D) Of an 800 mg dose, 0 mg will be present in a person's system 9 hours after the dose is taken.

9. Bianca invests \$7600 in an account that earns 4.2% annual interest compounded monthly.

A) **Write** a function to model the situation.

$$f(x) = 7600 \left(1 + \frac{0.042}{12}\right)^{12x}$$

initial investment

annual rate

compounded 12 times per year

x = years

B) **Determine** how long it will take for the value of the investment to reach \$20,000. Round your answer to the nearest year.

24 years
(rounded up to year 24 to make sure 20,000 has occurred)

$$20,000 = 7,600 (1.0035)^{12x}$$

$$\div 7600 \quad \div 7600$$

$$2.6315789 = 1.0035^{12x}$$

change of base

$$\frac{\log 2.6315789}{\log 1.0035} = 12x$$

$$276.936 = 12x$$

$$\div 12 \quad \div 12$$

Common misconceptions
students may not correctly adjust the annual rate to a quarterly rate.
students might not be familiar with change of base but can use a table of values instead.
x = 23.078 years