Warm Up

Extract roots to rewrite each radical expression.

1. $\sqrt{48}$

2. $\sqrt{27}$

3. $\sqrt{32}$

1. **Match each expression to an equivalent expression in the box. For each given expression, $a \neq 0$.**

a. $a^3 \cdot a$

b. $\frac{a^3}{a^7}$

c. $a^4 \cdot a^{-4}$

d. $(ab^2)^2$

e. $(a^2)^2$

f. $\frac{a^6}{a^6}$

g. $(a^8\, b^4)^{\frac{1}{2}}$

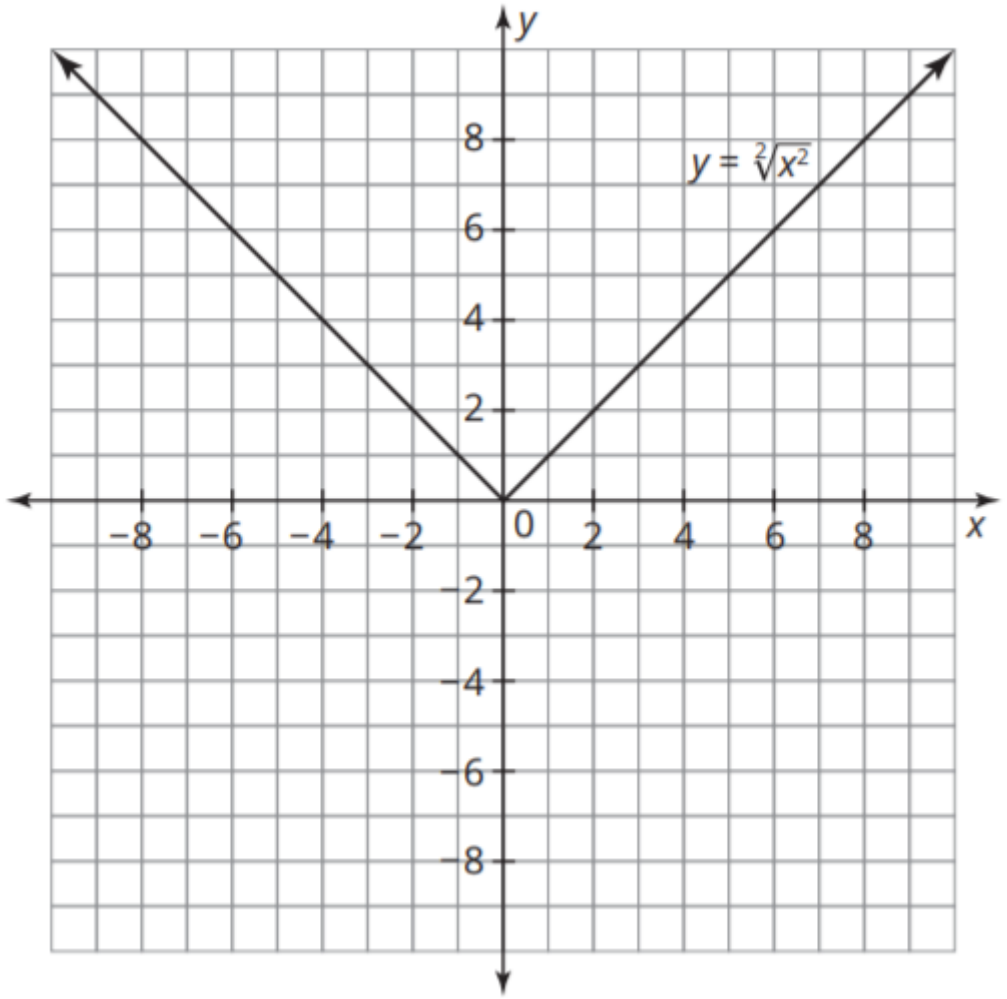
h. $a^2 \cdot a^{-6}$

1
a^4
a^{-4}
a^2b^4
a^4b^2

2. Jamal says that the expression $\frac{a^6}{a^6}$ is equivalent to 1 because any number, except 0, divided by itself is 1. Brittany says $\frac{a^6}{a^6}$ is equal to 1 because $a^{6-6} = a^0$, and anything to the zero power, except zero, equals 1. Who's correct? Explain your reasoning.

3. Consider each expression in Question 1. If a and b are real numbers, what do you know about the value of each expression? Explain your reasoning.

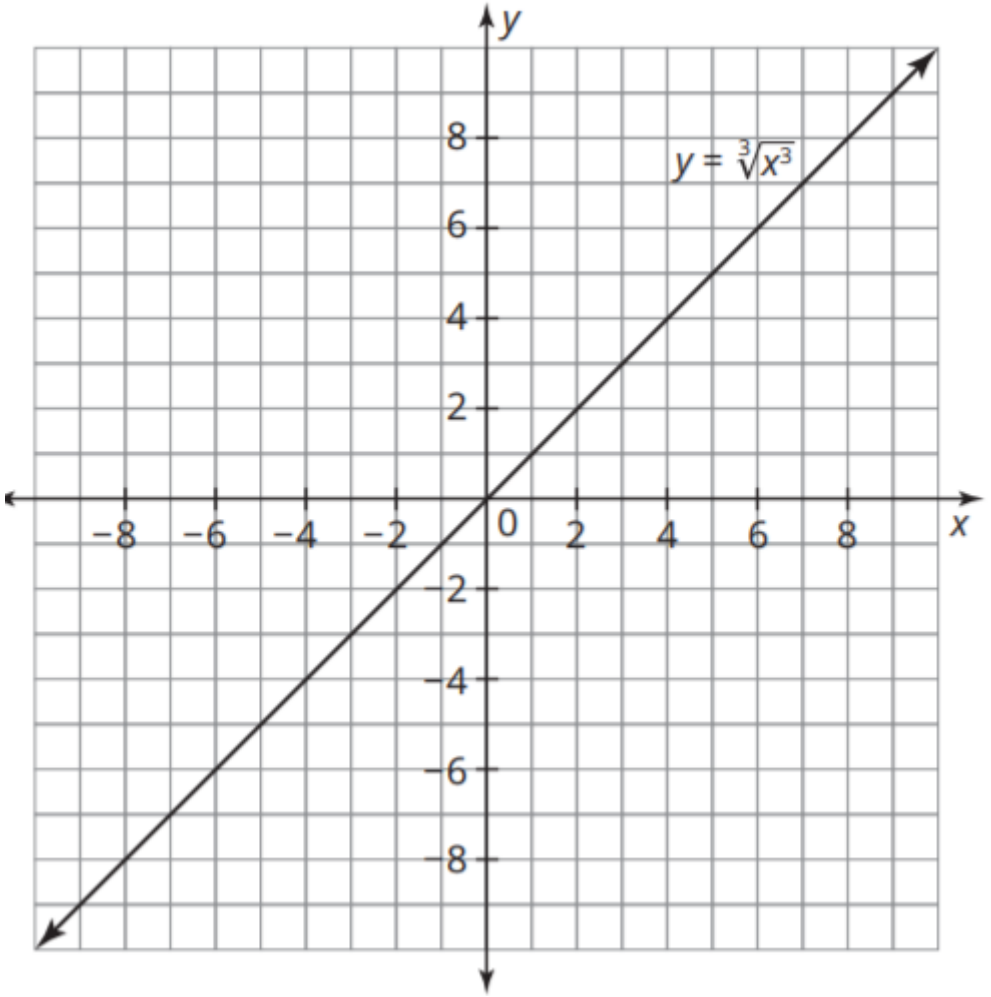
x	$x^n = x^2$	$\sqrt[n]{x^n} = \sqrt[2]{x^2}$
−2	4	2
−1	1	1
0	0	0
1	1	1
2	4	2



Function family of the graph: _____

Equation of the graph: _____

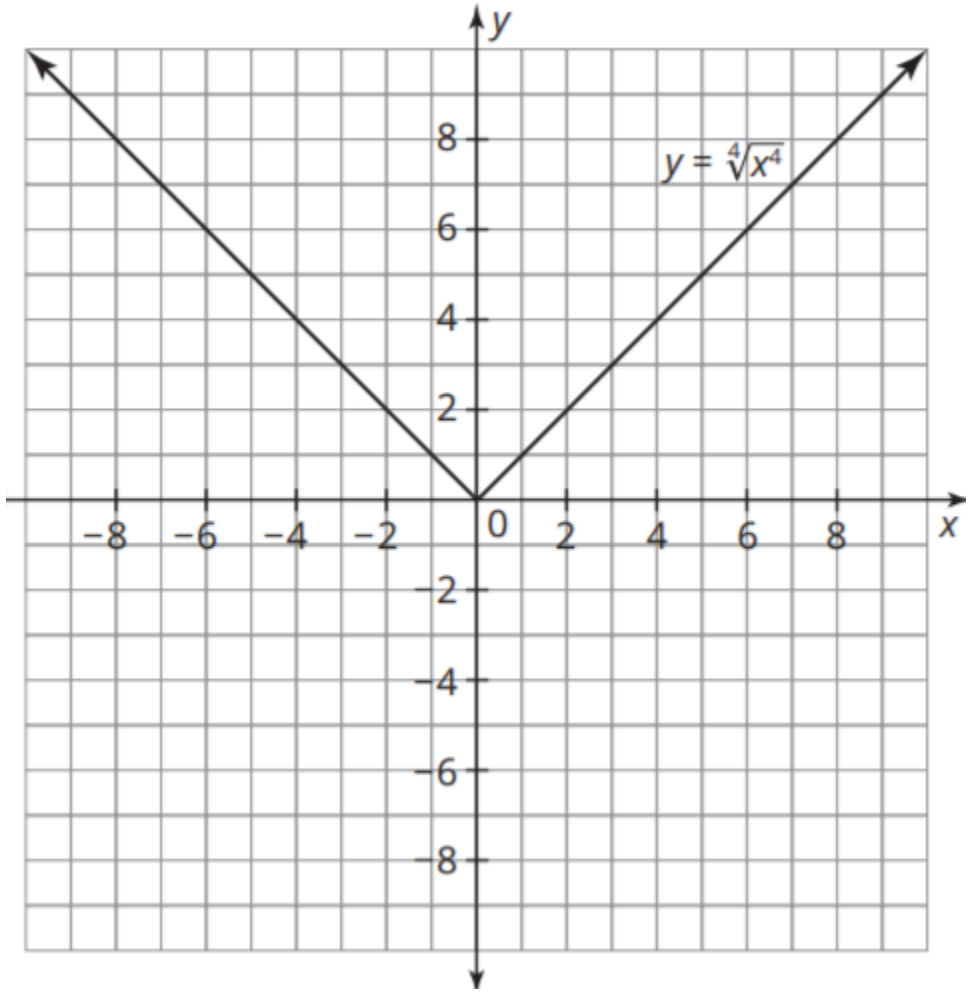
x	$x^n = x^3$	$\sqrt[n]{x^n} = \sqrt[3]{x^3}$
−2	−8	−2
−1	−1	−1
0	0	0
1	1	1
2	8	2



Function family of the graph: _____

Equation of the graph: _____

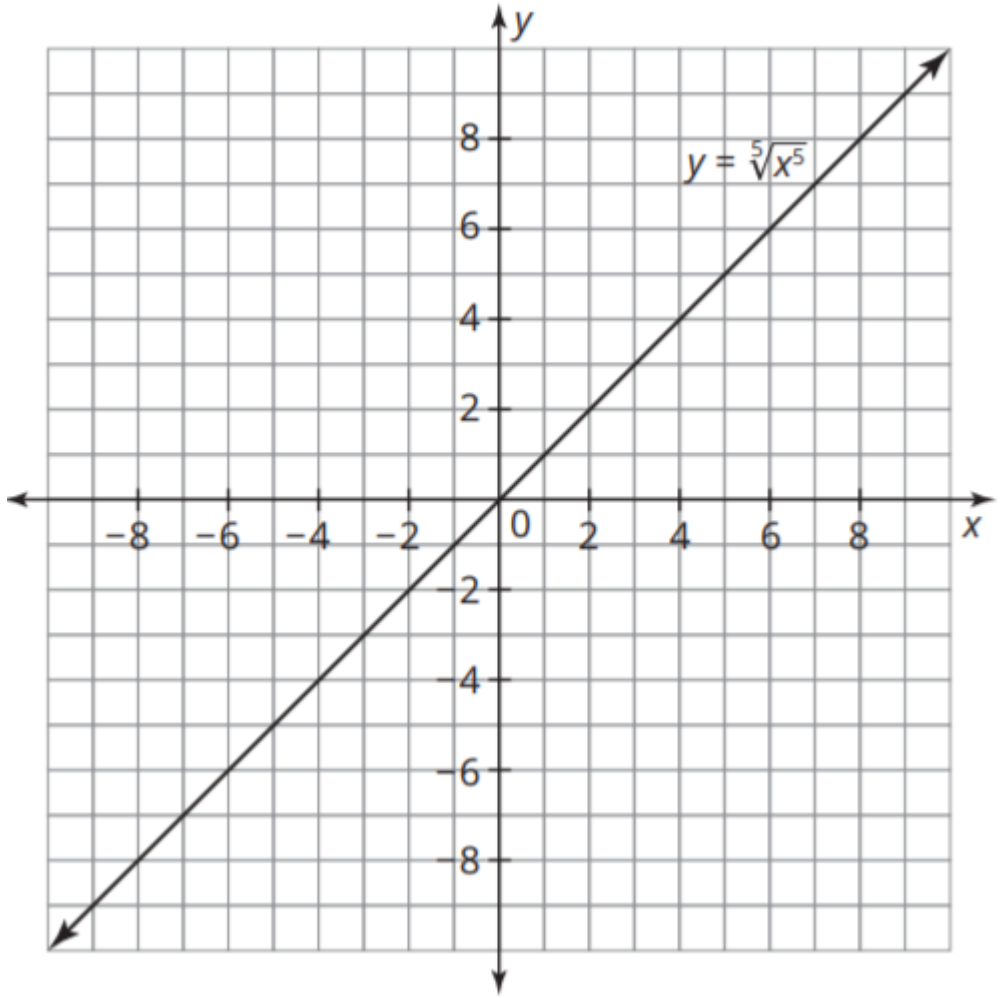
x	$x^n = x^4$	$\sqrt[n]{x^n} = \sqrt[4]{x^4}$
−2	16	2
−1	1	1
0	0	0
1	1	1
2	16	2



Function family of the graph: _____

Equation of the graph: _____

x	$x^n = x^5$	$\sqrt[n]{x^n} = \sqrt[5]{x^5}$
−2	−32	−2
−1	−1	−1
0	0	0
1	1	1
2	32	2



Function family of the graph: _____

Equation of the graph: _____

e. Analyze the representations for each value of *n*. What do you notice?

To extract a variable from a radical, the expression $\sqrt[n]{x^n}$ can be written as:

$$\sqrt[n]{x^n} = \begin{cases} |x|, \text{ when } n \text{ is even} \\ x, \quad \text{when } n \text{ is odd} \end{cases}$$

2. Explain why $\sqrt[7]{x^7} = |x|$ is incorrect, for real values of x.

One way to say $\sqrt[7]{x^7}$ is "the seventh root of x to the seven."

3. Asia and Melissa shared their work for extracting the root from $\sqrt{x^4}$, for real values of x.

Asia

$$\sqrt{x^4} = |x^2|$$

Melissa

$$\sqrt{x^4} = \sqrt{x^2 \cdot x^2}$$

$$= x^2$$

Who's correct? Explain your reasoning.