Algebra 1

Our Goal: To learn about properties of square roots

Warm Up: Test discussion

Today's Homework:
9.1 Textbook Exercises, p.485-486:
14-28 (evens), 40-60 (multiples of 4), and 75, 80
(that's 14,16,18,20,22,24,26,28,40,44,48,52,56,60,75,80)

iready due today, if needed

Previous Homework
None

Every positive # has 2 square roots, 1 positive and one negative.

$\sqrt{36}$

$-\sqrt{36}$

$\pm\sqrt{36}$

$\sqrt{36}$

$\sqrt{36}$

$\sqrt{36}$

$\sqrt{36}$

Simplify.

1. $\sqrt{16}$

4

2. $\sqrt{64}$

8

3. $\sqrt{225}$

4. $\sqrt{2025}$

5. $\sqrt{57,600}$

6. $\sqrt{36}$

7. $\sqrt{400}$

8. $\sqrt{4}$

9. $\sqrt{3600}$

$-\sqrt{121}$

$\pm\sqrt{50}$

Determine whether the function represents *exponential growth* or *exponential decay*. Identify the percent rate of change.

1. $y = 5(0.7)^t$

2. $y = 49(1.04)^t$

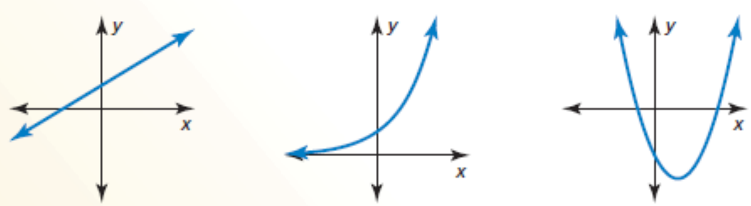
3. $r(t) = 0.5(0.95)^t$

4. $g(t) = 3\left(\frac{4}{5}\right)^t$

Core Concept

Linear, Exponential, and Quadratic Functions

Linear Function	Exponential Function	Quadratic Function
$y = mx + b$	$y = ab^x$	$y = ax^2 + bx + c$



Core Concept

Differences and Ratios of Functions

You can use patterns between consecutive data pairs to determine which type of function models the data. The differences of consecutive y-values are called *first differences*. The differences of consecutive first differences are called *second differences*.

- **Linear Function** The first differences are constant.
- **Exponential Function** Consecutive y-values have a common *ratio*.
- **Quadratic Function** The second differences are constant.

In all cases, the differences of consecutive x-values need to be constant.

Tell whether each table of values represents a *linear*, an *exponential*, or a *quadratic* function.

a.

x	−3	−2	−1	0	1
y	11	8	5	2	−1

b.

x	−2	−1	0	1	2
y	1	2	4	8	16

c.

x	−2	−1	0	1	2
y	−1	−2	−1	2	7

Core Concept

Product Property of Square Roots

Words The square root of a product equals the product of the square roots of the factors.

Numbers $\sqrt{9 \cdot 5} = \sqrt{9} \cdot \sqrt{5} = 3\sqrt{5}$

Algebra $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$, where $a, b \geq 0$

$\sqrt{\square}$ ← the radical

The radicand

Rule 1: make the radicand as small as possible. (no square factors)

Rule 2: no fractions in the radicand.

Rule 3: no radicals in the denominator.

Simplify the square roots.

$\sqrt{49}$

$\sqrt{50}$

$\sqrt{25 \cdot 2}$

$\sqrt{25} \cdot \sqrt{2}$

$\boxed{5 \cdot \sqrt{2}}$

$\sqrt{50} = \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2} + \sqrt{2}$

Simplify the expression.

1. $\sqrt{24}$ **2.** $-\sqrt{80}$ **3.** $\sqrt{49x^3}$ **4.** $\sqrt{75n^5}$

$\sqrt{6\cdot 4}$

$\sqrt{6}\cdot\sqrt{4}$

$\sqrt{6}\cdot 2$

$2\sqrt{6}$

$-\sqrt{20\cdot 4}$

$-\sqrt{20}\cdot\sqrt{4}$

$-2\cdot\sqrt{20}$

$-2\cdot\sqrt{4\cdot 5}$

$-2\cdot\sqrt{4}\cdot\sqrt{5}$

$-4\sqrt{5}$

simplest radical form

$\sqrt{49}\cdot\sqrt{x^3}$

$7\sqrt{x^3}$

$7\sqrt{x^2}\cdot\sqrt{x}$

$7x\sqrt{x}$

$$\frac{6}{8}=\frac{3}{4}$$

$$\frac{20}{24}=\frac{10}{12}=\frac{5}{6}$$

$\sqrt{75n^5}$

$\sqrt{25} \cdot \sqrt{3} \cdot \sqrt{n^4} \cdot \sqrt{n}$

$5 \cdot \sqrt{3} \cdot n^2 \cdot \sqrt{n}$

$5n^2\sqrt{3n}$

Core Concept

Quotient Property of Square Roots

Words The square root of a quotient equals the quotient of the square roots of the numerator and denominator.

Numbers $\sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$ **Algebra** $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$, where $a \geq 0$ and $b > 0$

$\sqrt{\frac{5}{9}} \quad \frac{\sqrt{5}}{\sqrt{9}} = \frac{\sqrt{5}}{3}$

Simplify the expression.

5. $\sqrt{\frac{23}{9}}$ $\frac{\sqrt{23}}{3}$

$\frac{\sqrt{23}}{3}$

6. $-\sqrt{\frac{17}{100}}$

$-\frac{\sqrt{17}}{10}$

7. $\sqrt{\frac{36}{z^2}}$

$\frac{6}{z}$

8. $\sqrt{\frac{4x^2}{64}}$

$\frac{x}{4} = \frac{2x}{8}$

9. $\sqrt[3]{54}$

$\sqrt[3]{27 \cdot 2}$

$\sqrt[3]{27} \cdot \sqrt[3]{2}$

$3\sqrt[3]{2}$

10. $\sqrt[3]{16x^4}$

11. $\sqrt[3]{\frac{a}{-27}}$

12. $\sqrt[3]{\frac{25c^7d^3}{64}}$

Simplify $\frac{7}{2-\sqrt{3}}$.

$$\frac{7}{2-\sqrt{3}} \cdot \frac{2+\sqrt{3}}{2+\sqrt{3}}$$

$$\frac{7(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})} \quad \frac{14+7\sqrt{3}}{4+\cancel{2\sqrt{3}}-\cancel{2\sqrt{3}}-3}$$

$$14+7\sqrt{3}$$

$$\sqrt{\frac{2}{3}} \quad \frac{\sqrt{2}\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{\sqrt{6}}{\sqrt{9}} = \frac{\sqrt{6}}{3}$$

$$\sqrt{200}$$

$$\sqrt{100} \cdot \sqrt{2}$$

$$10\sqrt{2}$$

Simplify the expression.

13. $\frac{1}{\sqrt{5}}$ **14.** $\frac{\sqrt{10}}{\sqrt{3}}$ **15.** $\frac{7}{\sqrt{2x}}$ **16.** $\sqrt{\frac{2y^2}{3}}$

$$\frac{1 \cdot \sqrt{5}}{\sqrt{5} \cdot \sqrt{5}} = \frac{\sqrt{5}}{\sqrt{25}} = \frac{\sqrt{5}}{5}$$

17. $\frac{5}{\sqrt[3]{32}}$ **18.** $\frac{8}{1+\sqrt{3}}$ **19.** $\frac{\sqrt{13}}{\sqrt{5}-2}$ **20.** $\frac{12}{\sqrt{2}+\sqrt{7}}$

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The ratio of the length to the width of a *golden rectangle* is $\left(1+\sqrt{5}\right)$: 2. The dimensions of the face of the Parthenon in Greece form a golden rectangle. What is the height h of the Parthenon?

Simplify $\sqrt{5}\left(\sqrt{3}-\sqrt{75}\right)$.

Simplify $\sqrt{5} - 5\sqrt{13} - 8\sqrt{5}$

Simplify the expression.

23. $3\sqrt{2} - \sqrt{6} + 10\sqrt{2}$

24. $4\sqrt{7} - 6\sqrt{63}$

25. $4\sqrt[3]{5x} - 11\sqrt[3]{5x}$

26. $\sqrt{3}\left(8\sqrt{2} + 7\sqrt{32}\right)$

27. $\left(2\sqrt{5} - 4\right)^2$

28. $\sqrt[3]{-4}\left(\sqrt[3]{2} - \sqrt[3]{16}\right)$