1.5 Start Thinking

The inverse of a mathematical operation reverses, or "un-does," the operation. For example, addition is the inverse of subtraction because addition reverses subtraction.

What is the inverse of x^2? Give examples for two values of x. What is the inverse of x^3?

1.5 Warm Up

Use the Pythagorean Theorem to find the hypotenuse *c* of a right triangle with the given leg lengths *a* and *b*. Round your answer to the nearest tenth.

1. $a = 3,\ b = 3$

2. $a = 9,\ b = 2$

3. $a = 5,\ b = 7$

4. $a = 4,\ b = 5$

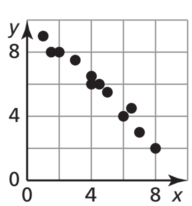
5. $a = 2,\ b = 1$

6. $a = 5,\ b = 2$

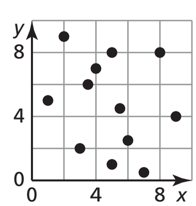
1.5 Cumulative Review Warm Up

Tell whether *x* and *y* show a *positive*, a *negative*, or *no correlation*.

1.



2.



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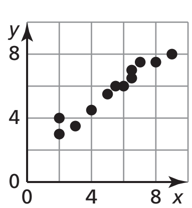

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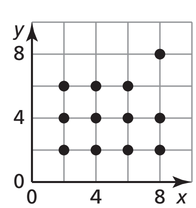

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1.5 Practice A

In Exercises 1 and 2, rewrite the expression in rational exponent form.

1. $\sqrt{7}$

2. $\sqrt[4]{13}$

In Exercises 3 and 4, rewrite the expression in radical form.

3. $14^{1/4}$

4. $117^{1/6}$

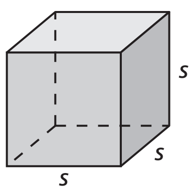
In Exercises 5 and 6, find the indicated real *n*th root(s) of *a*.

5. $n = 3, a = 27$

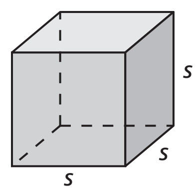
6. $n = 4, a = 16$

In Exercises 7 and 8, find the dimensions of the cube. Check your answer.

7. Volume $= 125\text{ ft}^3$



8. Volume $= 343\text{ m}^3$



In Exercises 9–11, evaluate the expression.

9. $\sqrt[3]{-125}$

10. $\sqrt[4]{81}$

11. $\sqrt[4]{-625}$

In Exercises 12 and 13, rewrite the expression in rational exponent form.

12. $\left(\sqrt[4]{14}\right)^3$

13. $\left(\sqrt[3]{-40}\right)^5$

In Exercises 14 and 15, rewrite the expression in radical form.

14. $10^{3/5}$

15. $(-3)^{6/5}$

In Exercises 16–18, evaluate the expression.

16. $81^{3/4}$

17. $25^{3/2}$

18. $(-27)^{2/3}$

19. The area of a square patio is 49^3 square inches. Find the length of one side of the patio.

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1.5 Practice B

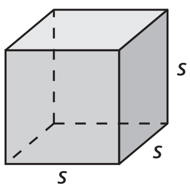
In Exercises 1 and 2, find the indicated *n*th root(s) of *a*.

1. $n = 6, a = 64$

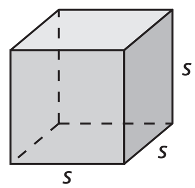
2. $n = 5, a = 243$

In Exercises 3 and 4, find the dimensions of the cube. Check your answer.

3. Volume $= 729\text{ cm}^3$



4. Volume $= 1000\text{ yd}^3$



In Exercises 5–7, evaluate the expression.

5. $-\sqrt[3]{-512}$

6. $729^{1/6}$

7. $(-625)^{1/4}$

In Exercises 8 and 9, rewrite the expression in rational exponent form.

8. $\left(\sqrt[5]{-53}\right)^4$

9. $\left(\sqrt[4]{110}\right)^7$

In Exercises 10 and 11, rewrite the expression in radical form.

10. $(-34)^{4/9}$

11. $41^{7/4}$

In Exercises 12–17, evaluate the expression.

12. $(-128)^{3/7}$

13. $(-25)^{5/2}$

14. $1000^{4/3}$

15. $\left(\frac{1}{125}\right)^{2/3}$

16. $(343)^{-1/3}$

17. $\left(\frac{1}{64}\right)^{3/2}$

18. The radius of a sphere is given by the equation $r = \left(\frac{3V}{4\pi}\right)^{1/3}$, where V is the volume of the sphere. Find the radius, to the nearest centimeter, of a sphere that has a volume of 268 cubic centimeters. Use 3.14 for π.

19. Use the formula $r = \left(\frac{F}{P}\right)^{1/n} - 1$ to find the annual inflation rate to the nearest tenth of a percent. A rare coin increases in value from \$0.25 to \$1.50 over a period of 30 years.

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1.5 Enrichment and Extension

Simplifying Radical Expressions

When simplifying with radicals and rational exponents, you should not leave either in the denominator of an expression. To fix this, use the method of rationalizing the denominator. Multiply the expression by an appropriate form of 1 that creates a perfect *n*th power in the denominator.

Example: Simplify (a) $\frac{2}{\sqrt{3}}$ and (b) $\frac{5}{x^{1/3}}$.

a. $\frac{2}{\sqrt{3}} \bullet \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\sqrt{9}} = \frac{2\sqrt{3}}{3}$

b. $\frac{5}{x^{1/3}} \bullet \frac{x^{2/3}}{x^{2/3}} = \frac{5x^{2/3}}{x}$

Simplify the expression. Write your answer using only positive exponents.

1. $\frac{20\sqrt{2}}{2\sqrt{8}}$

2. $\frac{3 - \sqrt{2}}{\sqrt{12}}$

3. $x^{-5/3}$

4. $\left(x^{-4}\right)^{3/8}$

5. $x^3 \bullet x^{-2/3} \bullet x^{1/2}$

6. $\frac{\sqrt[8]{16}}{\sqrt[5]{4}}$

7. $\sqrt[3]{\frac{125}{81}}$

8. $27^{1/2} \bullet 3^{-1/2}$

9. $\sqrt[6]{x^{-10}}$

10. $\frac{x^2}{x^{1/5}}$

11. $(-27)^{-4/3}$

12. $\frac{2x^{-1/3}}{x^{1/6} \bullet x^{-1/2}}$

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1.5 Puzzle Time

Why Did The Mother Skunk Take Her Baby To See The Doctor?

Write the letter of each answer in the box containing the exercise number.

Rewrite the expression in rational exponent form.

1. $\sqrt{8}$

2. $\sqrt[6]{43}$

3. $\left(\sqrt[3]{9}\right)^5$

4. $\left(\sqrt[7]{-51}\right)^{11}$

Rewrite the expression in radical form.

5. $19^{1/4}$

6. $802^{1/7}$

7. $(-12)^{2/5}$

8. $16^{3/2}$

Evaluate the expression.

9. $\sqrt[3]{125}$

10. $\sqrt[5]{-32}$

11. $243^{1/5}$

12. $(512)^{1/3}$

13. $64^{5/6}$

14. $(256)^{3/4}$

15. $(-128)^{5/7}$

16. $(-125)^{4/3}$

17. $\left(\frac{1}{64}\right)^{5/6}$

18. $\left(\frac{16}{625}\right)^{3/4}$

19. $(343)^{-2/3}$

20. $\frac{1}{81^{1/4}}$

21. The volume of a number cube is 3^6 cubic millimeters. Find the length of one side of the number cube.

Answers

O. 64

S. $\left(\sqrt{16}\right)^3$

E. $(-51)^{11/7}$

C. $\frac{1}{32}$

W. 8

U. $9^{5/3}$

I. $\frac{1}{49}$

O. 625

U. $\left(\sqrt[5]{-12}\right)^2$

B. -2

A. $8^{1/2}$

F. 32

O. $\frac{8}{125}$

T. $43^{1/6}$

E. 5

S. -32

R. $\frac{1}{3}$

D. 9

T. $\sqrt[4]{19}$

A. $\sqrt[7]{802}$

O. 3

10	4	17	6	3	15	9		19	5		12	1	8	
16	7	2		18	13		14	21	11	20				