

6-3

Practice

Form K

Binomial Radical Expressions

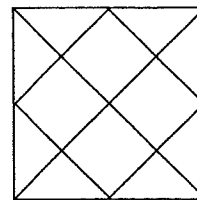
Simplify if possible. To start, determine if the expressions contain like radicals.

1. $3\sqrt{5} + 4\sqrt{5}$
both radicals

2. $8\sqrt[3]{4} - 6\sqrt[3]{4}$

3. $2\sqrt{xy} + 2\sqrt{y}$

4. A floor tile is made up of smaller squares. Each square measures 3 in. on each side. Find the perimeter of the floor tile.



Simplify. To start, factor each radicand.

5. $\sqrt{18} + \sqrt{32}$

6. $\sqrt[4]{324} - \sqrt[4]{2500}$

7. $\sqrt[3]{192} + \sqrt[3]{24}$

$= \sqrt{9 \cdot 2} + \sqrt{16 \cdot 2}$

Multiply.

8. $(3 - \sqrt{6})(2 - \sqrt{6})$

9. $(5 + \sqrt{5})(1 - \sqrt{5})$

10. $(4 + \sqrt{7})^2$

Multiply each pair of conjugates.

11. $(7 - \sqrt{2})(7 + \sqrt{2})$

12. $(1 + 3\sqrt{3})(1 - 3\sqrt{3})$

13. $(6 + 4\sqrt{7})(6 - 4\sqrt{7})$

6-3

Practice (continued)

Form K

Binomial Radical Expressions

Rationalize each denominator. Simplify the answer.

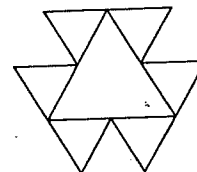
14. $\frac{3}{2 + \sqrt{6}}$

$$= \frac{3}{2 + \sqrt{6}} \cdot \frac{2 - \sqrt{6}}{2 - \sqrt{6}}$$

15. $\frac{7 + \sqrt{5}}{6 - \sqrt{5}}$

16. $\frac{1 - 2\sqrt{10}}{4 + \sqrt{10}}$

17. A section of mosaic tile wall has the design shown at the right. The design is made up of equilateral triangles. Each side of the large triangle is 4 in. and each side of a small triangle is 2 in. Find the total area of the design to the nearest tenth of an inch.



Simplify. Assume that all variables are positive.

18. $\sqrt{45} - \sqrt{80} + \sqrt{245}$

19. $(2 - \sqrt{98})(3 + \sqrt{18})$

20. $6\sqrt{192xy^2} + 4\sqrt{3xy^2}$

21. **Error Analysis** A classmate simplified the expression $\frac{1}{1 - \sqrt{2}}$ using the steps shown. What mistake did your classmate make? What is the correct answer?

$$\begin{aligned} & \frac{1}{1 - \sqrt{2}} \cdot \frac{1 - \sqrt{2}}{1 - \sqrt{2}} \\ &= \frac{1 - \sqrt{2}}{1 - 2} = \frac{1 - \sqrt{2}}{-1} = -1 + \sqrt{2} \end{aligned}$$

22. **Writing** Explain the first step in simplifying $\sqrt{405} + \sqrt{80} - \sqrt{5}$.

6-4

Practice

Form K

Rational Exponents

Simplify each expression.

1. $16^{\frac{1}{4}}$
 $\sqrt[4]{16}$

2. $(-3)^{\frac{1}{3}} \cdot (-3)^{\frac{1}{3}} \cdot (-3)^{\frac{1}{3}}$

3. $5^{\frac{1}{2}} \cdot 45^{\frac{1}{2}}$

Write each expression in radical form.

4. $x^{\frac{1}{4}}$

5. $x^{\frac{4}{5}}$

6. $x^{\frac{2}{9}}$

Write each expression in exponential form.

7. $\sqrt[3]{2}$

8. $\sqrt[3]{2x^2}$

9. $\sqrt[3]{(2x)^2}$

10. Bone loss for astronauts may be prevented with an apparatus that rotates to simulate gravity. In the formula $N = \frac{a^{0.5}}{2\pi r^{0.5}}$, N is the rate of rotation in revolutions per second, a is the simulated acceleration in m/s^2 , and r is the radius of the apparatus in meters. How fast would an apparatus with the following radii have to rotate to simulate the acceleration of 9.8 m/s^2 that is due to Earth's gravity?

a. $r = 1.7 \text{ m}$

b. $r = 3.6 \text{ m}$

c. $r = 5.2 \text{ m}$

- d.
- Reasoning**
- Would an apparatus with radius
- 0.8 m
- need to spin faster or slower than the one in part (a)?

6-4

Practice (continued)

Form K

Rational Exponents

Simplify each number.

11. $(-216)^{\frac{1}{3}}$
 $\sqrt[3]{-216}$

12. $243^{1.2}$

13. $32^{-0.4}$

Find each product or quotient. To start, rewrite the expression using exponents.

14. $(\sqrt[4]{6})(\sqrt[3]{6})$
 $= (6^{\frac{1}{4}})(6^{\frac{1}{3}})$

15. $\frac{\sqrt[5]{x^2}}{\sqrt[10]{x^2}}$

16. $\sqrt{20} \cdot \sqrt[3]{135}$

Simplify each number.

17. $(125)^{\frac{2}{3}}$

18. $(216)^{\frac{2}{3}}(216)^{\frac{2}{3}}$

19. $(-243)^{\frac{2}{5}}$

Write each expression in simplest form. Assume that all variables are positive.

20. $(16x^{-8})^{-\frac{3}{4}}$

21. $(8x^{15})^{-\frac{1}{3}}$

22. $\left(\frac{x^2}{x^{-10}}\right)^{\frac{1}{3}}$

23. **Error Analysis** Explain why the following simplification is incorrect. What is the correct simplification?

$$5\left(4 - 5^{\frac{1}{2}}\right)$$

$$= 5(4) - 5\left(5^{\frac{1}{2}}\right) = 20 - 25^{\frac{1}{2}} = 15$$