

Rational Exponents

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^{\frac{x}{n}} = \sqrt[n]{a^x} = (\sqrt[n]{a})^x$$

A. Express in radical form.

1. $5^{\frac{1}{4}}$

2. $m^{\frac{1}{2}}$

3. $(5x^6)^{\frac{1}{2}}$

4. $6^{\frac{3}{4}}$

B. Express in exponent form.

1. $\sqrt[5]{x^9}$

2. $\sqrt[5]{(6t)^2}$

3. $\frac{1}{\sqrt[4]{(5x)^3}}$

4. $\frac{1}{\sqrt[3]{y^2}}$

Simplify completely:

1. $32^{\frac{1}{5}}$

2. $\left(5^{\frac{1}{3}}\right)^3$

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

4. $(64)^{\frac{1}{6}}$

5. Evaluate (2 ways) $4^{\frac{3}{2}} = \left(4^{\frac{1}{2}}\right)^3$ or $4^{\frac{3}{2}} = (4^3)^{\frac{1}{2}}$

Simplify completely.

6. $(-64)^{\frac{1}{3}}$

7. $(-27)^{\frac{4}{3}}$

8. $(625^{-1})^{-\frac{1}{4}}$

9. $\frac{(27)^{\frac{2}{3}}}{(25)^{\frac{1}{2}}}$

10. $\left(\frac{25}{16}\right)^{-\frac{3}{2}}$

11. $\left(\frac{256}{81}\right)^{-\frac{5}{4}}$

12. $\left(81^{\frac{5}{2}}\right)^{\frac{1}{2}}$

13. $\left(\frac{49}{121}\right)^{-\frac{1}{2}}$

More Practice with Rational Exponents!

A. Express with a rational exponent.

1) $\sqrt[3]{xz}$ 2) $\sqrt[4]{y^3}$ 3) $\sqrt[4]{y}$ 4) $\sqrt{(3z)^3}$ 5) $\sqrt[3]{2xz}$ 6) $\sqrt[3]{(2z)^5}$

B. Express as a radical.

7) $5^{\frac{1}{4}}$ 8) $m^{\frac{7}{3}}$ 9) $(2m)^{\frac{1}{3}}$ 10) $x^{\frac{3}{5}}$ 11) $(xy)^{\frac{1}{5}}$ 12) $m^{-\frac{1}{2}}$

C. Evaluate.

13) $81^{\frac{1}{2}}$ 14) $1000^{\frac{1}{3}}$ 15) $16^{\frac{1}{4}}$ 16) $125^{\frac{1}{3}}$ 17) $4^{\frac{3}{2}}$ 18) $8^{\frac{2}{3}}$

19) $2^{\frac{5}{2}}$ 20) $3^{\frac{3}{2}}$ 21) $27^{-\frac{1}{2}}$ 22) $100^{-\frac{1}{2}}$ 23) $27^{-\frac{2}{3}}$ 24) $8^{\frac{4}{3}}$

25) $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ 26) $3(3)^{\frac{1}{5}}$ 27) $100^{\frac{3}{2}}$ 28) $\left(\frac{1}{64}\right)^{\frac{-1}{3}}$ 29) $\left(\frac{1}{16}\right)^{\frac{-1}{4}}$ 30) $\left(\frac{27}{64}\right)^{\frac{2}{3}}$

Name _____

Date _____

Radicals and Rational Exponents

Write each expression in radical form.

1) $7^{\frac{1}{2}}$

2) $4^{\frac{4}{3}}$

3) $2^{\frac{5}{3}}$

4) $7^{\frac{4}{3}}$

5) $6^{\frac{3}{2}}$

6) $2^{\frac{1}{6}}$

Write each expression in exponential form.

7) $(\sqrt{10})^3$

8) $\sqrt[6]{2}$

9) $(\sqrt[4]{2})^5$

10) $(\sqrt[4]{5})^5$

11) $\sqrt[3]{2}$

12) $\sqrt[6]{10}$

Write each expression in radical form.

13) $(5x)^{-\frac{5}{4}}$

14) $(5x)^{-\frac{1}{2}}$

15) $(10n)^{\frac{3}{2}}$

16) $a^{\frac{6}{5}}$

17) $(6v)^{1.5}$

18) $m^{-\frac{1}{2}}$

Write each expression in exponential form.

19) $(\sqrt[4]{m})^3$

20) $(\sqrt[3]{6x})^4$

21) $\sqrt[4]{v}$

22) $\sqrt{6p}$

23) $(\sqrt[3]{3a})^4$

24) $\frac{1}{(\sqrt{3k})^5}$

Simplify.

25) $9^{\frac{1}{2}}$

26) $343^{-\frac{4}{3}}$

27) $1000000^{\frac{1}{6}}$

28) $36^{\frac{3}{2}}$

29) $(x^6)^{\frac{1}{2}}$

30) $(9n^4)^{\frac{1}{2}}$

31) $(64n^{12})^{-\frac{1}{6}}$

32) $(81m^6)^{\frac{1}{2}}$