

Pre AP Pre Calculus  
Summer Review II Radicals and Rational Exponents

Properties of Radicals:

a.  $\sqrt[n]{uv} = \sqrt[n]{u} \cdot \sqrt[n]{v}$

d.  $(\sqrt[n]{u})^n = u$

b.  $\sqrt[n]{\frac{u}{v}} = \frac{\sqrt[n]{u}}{\sqrt[n]{v}}$

e.  $\sqrt[n]{u^m} = (\sqrt[n]{u})^m$

c.  $\sqrt[m]{\sqrt[n]{u}} = \sqrt[mn]{u}$

f.  $\sqrt[n]{u^n} = \begin{cases} |u|, & \text{if } n \text{ is even} \\ u, & \text{if } n \text{ is odd} \end{cases}$

I. Evaluate the expressions without using a calculator.

1.  $\sqrt{36}$

3.  $\sqrt[3]{-64}$

2.  $\sqrt{-144}$

4.  $\sqrt[3]{-\frac{64}{27}}$

II. Simplify. Answers must be exact.

5.  $\sqrt{288}$

7.  $\sqrt[3]{-27x^3y^7}$

6.  $\sqrt[3]{-250}$

8.  $\sqrt[5]{96x^{14}}$

III. Rationalize the denominator.

9.  $\frac{4}{\sqrt[3]{2}}$

11.  $\frac{\sqrt[5]{x^3}}{\sqrt{y^2}}$

10.  $\frac{1}{\sqrt{5}}$

12.  $\frac{\sqrt[3]{a^6}}{\sqrt{b^4}}$

IV. Convert to Exponential form.

13.  $\sqrt[3]{(a+2b)^2}$

14.  $\sqrt[5]{x^2y^3}$

15.  $xy^4\sqrt[3]{xy^3}$

V. Convert to Radical form.

16.  $a^{3/4}b^{1/4}$

17.  $(xy)^{-3/4}$

VI. Simplify the expression.

18.  $(x^2y^4)^{\frac{1}{2}}$

19.  $\left(\frac{x^{\frac{1}{2}}}{y^{\frac{2}{3}}}\right)^6$

20.  $\frac{(p^2q^4)^{\frac{1}{2}}}{(27q^3p^9)^{\frac{1}{3}}}$

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

22.  $\sqrt{16y^8z^{-2}}$

23.  $\sqrt[5]{\frac{4x^6y}{9x^3}}$

24.  $\sqrt[5]{9ab^6} \cdot \sqrt[5]{27a^2b^{-1}}$

25.  $\sqrt{18x^2y} + \sqrt{2y^3}$

VII. Word Problems

26. The time  $t$  (in seconds) that it takes for a pendulum to complete one cycle is approximately  $t = 1.1\sqrt{L}$ , where  $L$  is the length in feet of the pendulum. How long is the period of a pendulum of length 10 ft?

27. The time  $t$  (in seconds) that it takes a rock to fall a distance  $d$  (in meters) is approximately  $t = 0.45\sqrt{d}$ . How long does it take for the rock to fall a distance of 200m?

