Name Key Class _____ Date _____

6.1 - 6.5 Review

Lesson 6-1

How many real roots does a radical have if *n* is even: 2 (pos & neg) (index)

How many real roots does a radical have if *n* is odd: 1

When does a radical have no real roots: when its an even index with a negative radicand.

Find all of the real roots for each.

1. $\sqrt{36x^4}$ $\pm 6x^2$

2. $\sqrt{c^{80}d^{50}}$ $\pm c^{40}d^{25}$

3. $\sqrt[4]{81x^{12}}$ $\pm 3x^3$

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

5. $\sqrt[3]{27y^{15}}$ $3y^5$

6. $\sqrt[4]{-16}$ not possible

7. You can approximate the speed of a falling object as $v = 8\sqrt{d}$, where v is the speed in feet per second and d is the distance, in feet, the object has fallen. Express d in terms of v.

$\frac{v}{8} = \frac{8\sqrt{d}}{8}$ $\left(\frac{v}{8}\right)^2 = \sqrt{d}^2$ $d = \frac{v^2}{64}$

Lesson 6-2

State the rules for multiplying/dividing radicals:

If it has the same index multiply what is inside + keep inside or divide two radicals + keep inside

Multiply or divide and simplify.

8. $\sqrt{3x^4}\cdot\sqrt{24x^3}$ $\sqrt{72x^7}$ $6x^3\sqrt{2x}$

9. $\sqrt[3]{4}\cdot\sqrt[3]{18}$ $\sqrt[3]{72}$ $2\sqrt[3]{9}$

10. $\sqrt{5a^3}\cdot\sqrt{20a}$ $\sqrt{100a^4}$ $10a^2$

11. $\frac{\sqrt{80}}{\sqrt{5}}$ $\sqrt{16}$ 4

12. $\frac{\sqrt{90}}{\sqrt{2}}$ $\sqrt{45}$ $3\sqrt{5}$

13. $\frac{\sqrt[3]{640w^7}}{\sqrt[3]{5w}}$ $\sqrt[3]{128w^6}$ $4w^2\sqrt[3]{2}$

128 → 8 16 → 2 4 4

What does it mean to rationalize a denominator:

to get the ratical out of the denominator

State the steps for rationalizing a denominator:

multiply the top & bottom by the radical in the denominator

What is the conjugate of (a + b):

$a - b$

Rationalize the Denominators.

14. $\frac{\sqrt{5}}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}}$

$\frac{\sqrt{35}}{7}$

15. $\frac{5}{\sqrt[3]{7}} \cdot \frac{\sqrt[3]{49}}{\sqrt[3]{49}}$

$\frac{5\sqrt[3]{49}}{7}$

16. $\frac{5}{2-\sqrt{3}} \cdot \frac{2+\sqrt{3}}{2+\sqrt{3}}$

$\frac{10+5\sqrt{3}}{4-3} = 10+5\sqrt{3}$

Lesson 6-3

State the rules for adding/subtracting radicals:

the index & radicand must be the same & then you add or subtract the coefficients

Simplify.

17. $2\sqrt{7} + 3\sqrt{7}$

$5\sqrt{7}$

18. $8\sqrt{45} - 3\sqrt{80}$

$24\sqrt{5} - 12\sqrt{5}$

$12\sqrt{5}$

19. $\sqrt[4]{324} - 2\sqrt[4]{64}$

$3\sqrt[4]{4} - 4\sqrt[4]{4}$

$-\sqrt[4]{4}$

20. $(3\sqrt{5} - 2)(3\sqrt{5} + 2)$

$45 - 4$

41

21. $(\sqrt{10} + 3)^2$

$(\sqrt{10}+3)(\sqrt{10}+3)$

$10 + 3\sqrt{10} + 3\sqrt{10} + 9$

$19 + 6\sqrt{10}$

22. $(2 + \sqrt{5})(3 + \sqrt{5})$

$6 + 2\sqrt{5} + 3\sqrt{5} + 5$

$11 + 5\sqrt{5}$

Lesson 6-4

ex: $x^{\frac{a}{b}} = \sqrt[b]{x^a}$

How to convert from a radical to a rational exponent: the power is the numerator of the rational exponent & the index is the denominator

Convert each to a radical. Write each expression in simplest form.

23. $81^{\frac{1}{2}}$

$\sqrt{81} = 9$

24. $8^{\frac{2}{3}}$

$(\sqrt[3]{8})^2$

$2^2 = 4$

25. $36^{\frac{1}{4}} \cdot 36^{\frac{1}{4}}$

$36^{\frac{1}{2}}$

$\sqrt{36} = 6$

Convert each to an exponent. Write each expression in simplest form.

26. $\left(\sqrt[4]{x}\right)^3$

$x^{3/4}$

27. $\sqrt{y}$

$y^{\frac{1}{2}}$

28. $\sqrt{5} \cdot \sqrt[3]{5}$

$5^{\frac{1}{2}} \cdot 5^{\frac{1}{3}} = 5^{5/6}$

Lesson 6-5

What is the opposite of $\sqrt[n]{x}$**:** $\sqrt[n]{x} = x^{\frac{1}{n}} \rightarrow$ opposite $= x^n$

Solve. Check solutions.

29. $\sqrt{13-2x} + 10 = 15$

$-10 \quad -10$

$\sqrt{13-2x} = 5$

$(\sqrt{13-2x})^2 = 5^2$

$13 - 2x = 25$

$-13 \quad -13$

$-2x = 12$

$x = -6$ ✓

30. $\sqrt{x-1} = x-3$

$(\sqrt{x-1})^2 = (x-3)^2$

$x-1 = x^2 - 6x + 9$

$-x+1 \quad -x+1$

$0 = x^2 - 7x + 10$

$0 = (x-5)(x-2)$

$x = 5$ ✓ $\quad x \neq 2$

31. $2(x+3)^{\frac{3}{5}} = 16$

$\frac{2}{2} \quad \frac{2}{2}$

$\left[(x+3)^{\frac{3}{5}}\right]^{\frac{5}{3}} = (8)^{\frac{5}{3}}$

$x+3 = 32$

$x = 29$ ✓

32. The time T it takes a pendulum to make a full swing in each direction and return to its original position is called the period of the pendulum. The equation $T = 2\pi\sqrt{\frac{\ell}{32}}$ relates the length of the pendulum ℓ, in feet, to its period T, in seconds. How long is a pendulum if its period is 3 seconds? *Round the answer to the nearest tenth with units included.*

$\frac{3}{2\pi} = \frac{2\pi\sqrt{\frac{\ell}{32}}}{2\pi}$

$\left(\frac{3}{2\pi}\right)^2 = \left(\sqrt{\frac{\ell}{32}}\right)^2$

$\left(\frac{9}{4\pi^2} = \frac{\ell}{32}\right)32$

$\frac{288}{4\pi^2} = \ell$

$\frac{72}{\pi^2} = \ell$

$7.3 \text{ ft} = \ell$