Solving Equations

- Choose the best method (factoring, square roots, quadratic formula, etc) to solve each equation. Provide both real and complex (imaginary) solutions.

1. $\sqrt{5x+1} = x - 4$

2. $6x = 3x^2$

3. $\sqrt[3]{x} + 4 = 2$

4. $27 - x^2 = 54$

5. $2x^2 - 5x = 7$

6. $x^2 + 10x + 21 = 0$

7. $6x - 5 = 2x^2$

8. $\frac{1}{3}(x - 6) = -\frac{2}{5}x + \frac{14}{15}$

9. $\frac{1}{2}x^3 = 4$

10. $12x^3 - 84x^2 + 120x = 0$

Simplifying Radicals

Simplify the Expressions:

Example:

Simplify the expression $\sqrt{20}$
$$\sqrt{20} = \sqrt{4} \cdot \sqrt{5}$$
$$= 2\sqrt{5}$$

1. $\sqrt{40}$ **2.** $\sqrt{243}$ **3.** $\sqrt{52}$ **4.** $\sqrt{320}$

Simplify the Radical Expressions:

Examples:

a. $5\sqrt{3} - \sqrt{3} - \sqrt{2}$
$\quad = 4\sqrt{3} - \sqrt{2}$

b. $(2\sqrt{2})(5\sqrt{3})$
$\quad = 2 \cdot 5 \cdot \sqrt{2} \cdot \sqrt{3}$
$\quad = 10\sqrt{6}$

c. $(5\sqrt{7})^2$
$\quad = 5^2\sqrt{7^2}$
$\quad = 25 \cdot 7$
$\quad = 175$

5. $\sqrt{75} + \sqrt{3}$ **6.** $(5\sqrt{4})(2\sqrt{4})$ **7.** $(6\sqrt{5})^2$

Simplifying Quotients with Radicals:

Example:

Simplify the quotient $\frac{6}{\sqrt{5}}$

$$\frac{6}{\sqrt{5}} = \frac{6}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$
$$= \frac{6\sqrt{5}}{\sqrt{5}\sqrt{5}}$$
$$= \frac{6\sqrt{5}}{5}$$

8. $\dfrac{4}{\sqrt{3}}$ **9.** $\dfrac{2\sqrt{3}}{\sqrt{5}}$ **10.** $\dfrac{\sqrt{18}}{\sqrt{10}}$

Simplifying Exponents

Exponent Rules	
For $a \neq 0, b \neq 0$	
Product Rule	$a^x \times a^y = a^{x+y}$
Quotient Rule	$a^x \div a^y = a^{x-y}$
Power Rule	$\left(a^x\right)^y = a^{xy}$
Power of a Product Rule	$(ab)^x = a^x b^x$
Power of a Fraction Rule	$\left(\dfrac{a}{b}\right)^x = \dfrac{a^x}{b^x}$
Zero Exponent	$a^0 = 1$
Negative Exponent	$a^{-x} = \dfrac{1}{a^x}$
Fractional Exponent	$a^{\frac{x}{y}} = \sqrt[y]{a^x}$

Simplify each expression.

1. $(c^5)(c)(c^2)$

2. $\dfrac{m^{15}}{m^3}$

3. $(k^4)^5$

4. d^0

5. $(p^4 q^2)(p^7 q^5)$

6. $\dfrac{45y^3 z^{10}}{5y^3 z}$

7. $(-t^7)^3$

8. $3f^3 g^0$

9. $(4h^5 k^3)(15k^2 h^3)$

10. $\dfrac{12a^4 b^6}{36ab^2 c}$

11. $(3m^2 n)^4$

12. $(12x^2 y)^0$