

1. Simplify. Leave your answer in simplest radical form. NO DECIMALS.

$$1. \sqrt{\frac{16}{7}} = \frac{\sqrt{16}}{\sqrt{7} \cdot \sqrt{7}} = \boxed{\frac{4\sqrt{7}}{7}}$$

$$2. \sqrt{84} = \sqrt{4 \cdot 21} \\ = \boxed{2\sqrt{21}}$$

$$3. \frac{2\sqrt{5}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{10}}{2} = \boxed{\sqrt{10}}$$

$$4. 3\sqrt{6} \cdot 5\sqrt{18} \\ = 3 \cdot 5 \sqrt{6 \cdot 18} \\ = 15\sqrt{108} \\ = 15\sqrt{36 \cdot 3} \\ = 15 \cdot 6\sqrt{3}$$

$$5. 2\sqrt{90} + \sqrt{40} - 3\sqrt{490} \\ 2\sqrt{9 \cdot 10} + \sqrt{4 \cdot 10} - 3\sqrt{49 \cdot 10} \\ 2 \cdot 3\sqrt{10} + 2\sqrt{10} - 3 \cdot 7\sqrt{10} \\ 6\sqrt{10} + 2\sqrt{10} - 21\sqrt{10} \\ -11\sqrt{10}$$

$$6. 2\sqrt{63} - 5\sqrt{28} + 3\sqrt{14} \\ 2\sqrt{9 \cdot 7} - 5\sqrt{4 \cdot 7} + 3\sqrt{14} \\ = 6\sqrt{7} - 10\sqrt{7} + 3\sqrt{14} \\ = -4\sqrt{7} + 3\sqrt{14}$$

VI. Simplify. Write all final answers with positive exponents only.

$$7. x^{-8} \cdot 5x^6 \\ = 5x^{-8+6} \\ = 5x^{-2} \\ = \boxed{\frac{5}{x^2}}$$

$$8. (2x^{-3}y^5)^2 \\ 2^2 x^{-3 \cdot 2} y^{5 \cdot 2} \\ 4 x^{-6} y^{10} \\ \boxed{\frac{4y^{10}}{x^6}}$$

$$9. \left(\frac{15x^5y^{-3}}{10x^{-2}y^6} \right)^{-1} \\ \frac{15^{-1}x^{5-1}y^{-3-(-1)}}{10^{-1}x^{-2-(-1)}y^{6-(-1)}} \\ \frac{10x^{-5}y^3}{15x^2y^{-6}} = \frac{2x^{-5-2}y^{3-6}}{3} \\ = \boxed{\frac{2y^9}{3x^7}}$$

$$10. \frac{728a^{-5}b^{-3}c^3}{936a^7b^0c^{-3}} = \frac{7a^{-5-7}b^{-3-0}c^{3-3}}{9} \\ = \frac{7a^{-12}b^{-3}c^6}{9} \\ = \boxed{\frac{7c^6}{9a^{12}b^3}}$$

$$11. (-2x^2y^{-4})^2 (5x^{-5}y^6) \\ (-2)^2 x^{2 \cdot 2} y^{-4 \cdot 2} (5x^{-5}y^6) \\ 4x^4y^{-8} \cdot 5x^{-5}y^6 \\ 20x^{4+5}y^{-8+6} = 20x^{-1}y^{-2} \\ \boxed{\frac{20}{x^1y^2}}$$

$$12. \left(\frac{4a^3}{3b^{-2}} \right)^{-3} \\ (4)^{-3} a^{3 \cdot -3} = \frac{3^3 a^{-9}}{(3)^{-3} b^{-2 \cdot -3}} = \frac{3^3 a^{-9}}{4^3 b^6} \\ = \frac{27}{64 a^9 b^6}$$