Rewriting Radical Expressions Using Exponents Homework

Directions: Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable.

Part 1: Rewrite each expression using appropriate positive exponents, without radicals.

1. $\dfrac{d^{-3}}{(4c^3)^{-2} * 8d}$

2. $\dfrac{8\left(\sqrt{16v}\right)^6}{\sqrt[4]{16v}}$

3. $\sqrt{9x^7y^{-3}} * (3x^4y^{-1})^{-2}$

4. $\dfrac{54\left(\sqrt{rs}\right)^4}{3\sqrt[5]{rs}}$

5. $\left(\dfrac{\sqrt{144v^5w}}{w^5}\right)^{-1}$

6. $\sqrt{\sqrt[8]{(1-q)^3}}$

7. $8\sqrt{vw^3} - 4\sqrt{vw^4} + 28\sqrt{v}$

8. $\dfrac{\sqrt[3]{64p^{12}v^3} * (p^{-2})^4}{v^4}$

9. $\sqrt[3]{\sqrt{(w+2)^{-3}}}$

Part 2: Simplify each expression as far as possible as of now.
Express your final answers in both forms (radical and exponent), where possible.

1. $\left(\dfrac{81r^2s^3}{r^8s^{\frac{1}{3}}}\right)^{-\frac{1}{4}}$

2. $\dfrac{x^{\frac{2}{3}}y^{\frac{1}{2}}}{x^{\frac{-3}{2}}y}$

3. $\dfrac{(x^8y^5)^{\frac{1}{2}}}{(xy)^{-1}}$

4. $\left(\dfrac{r^3s^{\frac{3}{2}}}{r^{\frac{2}{3}}s}\right)^{-2}$

5. $\dfrac{(9z)^{\frac{4}{3}}}{(9z)^{\frac{10}{3}}}$

6.
s

7. $\left((64x^5)^{\frac{1}{2}}\right)^{-3}$

8. $(-125y^7)^{\frac{2}{3}}$

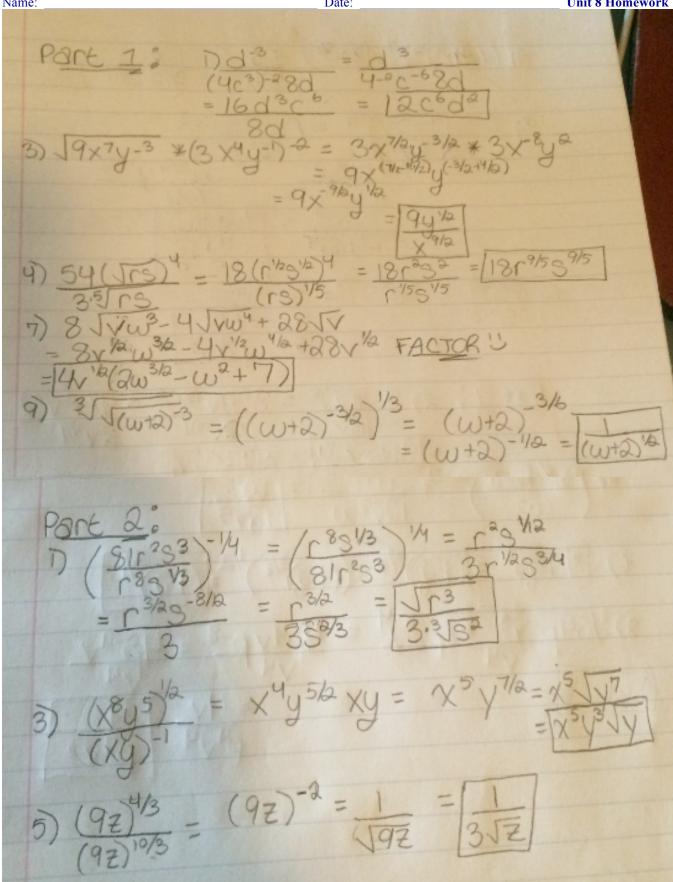9. $\left(\dfrac{4w^{\frac{1}{4}}y^{\frac{3}{2}}}{w^{\frac{2}{3}}y}\right)^{-3}$

10. $\dfrac{(3x)^3}{(3x)^{\frac{7}{2}}}$

11. $\dfrac{7\left(\sqrt[4]{s^3}\right)}{\sqrt[3]{s^4}}$

12. $\left(\dfrac{1000f^2x^9}{fx^{\frac{1}{4}}}\right)^{-\frac{1}{3}}$

<u>Selected Solutions:</u>

Part 1:

1) $\dfrac{d^{-3}}{(4c^3)^{-2}8d} = \dfrac{d^3}{4^{-2}c^{-6}8d}$

$= \dfrac{16d^3c^6}{8d} = \boxed{2c^6d^2}$

3) $\sqrt{9x^7y^{-3}} * (3x^4y^{-1})^{-2} = 3x^{7/2}y^{-3/2} * 3x^{-8}y^2$

$= 9x^{(7/2-8/2)}y^{(-3/2+4/2)}$

$= 9x^{-9/2}y^{1/2}$

$= \boxed{\dfrac{9y^{1/2}}{x^{9/2}}}$

4) $\dfrac{54(\sqrt{rs})^4}{3\sqrt[5]{rs}} = \dfrac{18(r^{1/2}s^{1/2})^4}{(rs)^{1/5}} = \dfrac{18r^2s^2}{r^{1/5}s^{1/5}} = \boxed{18r^{9/5}s^{9/5}}$

7) $8\sqrt{vw^3} - 4\sqrt{vw^4} + 28\sqrt{v}$

$= 8v^{1/2}w^{3/2} - 4v^{1/2}w^{4/2} + 28v^{1/2}$ FACTOR :)

$= \boxed{4v^{1/2}(2w^{3/2} - w^2 + 7)}$

9) $\sqrt[3]{\sqrt{(w+2)^{-3}}} = ((w+2)^{-3/2})^{1/3} = (w+2)^{-3/6}$

$= (w+2)^{-1/2} = \boxed{\dfrac{1}{(w+2)^{1/2}}}$

Part 2:

1) $\left(\dfrac{81r^2s^3}{r^8s^{1/3}}\right)^{-1/4} = \left(\dfrac{r^8s^{1/3}}{81r^2s^3}\right)^{1/4} = \dfrac{r^2s^{1/2}}{3r^{1/2}s^{3/4}}$

$= \dfrac{r^{3/2}s^{-8/12}}{3} = \dfrac{r^{3/2}}{3s^{2/3}} = \boxed{\dfrac{\sqrt{r^3}}{3\sqrt[3]{s^2}}}$

3) $\dfrac{(x^8y^5)^{1/2}}{(xy)^{-1}} = x^4y^{5/2} \, xy = x^5y^{7/2} = x^5\sqrt{y^7}$

$= \boxed{x^5y^3\sqrt{y}}$

5) $\dfrac{(9z)^{4/3}}{(9z)^{10/3}} = (9z)^{-2} = \dfrac{1}{\sqrt{9z}} = \boxed{\dfrac{1}{3\sqrt{z}}}$

7) $\left(\left(64x^5\right)^{1/6}\right)^{-3} = \left(8x^{5/6}\right)^{-3} = \dfrac{1}{8^3 x^{15/6}} = \dfrac{1}{512\sqrt{x^{15}}} = \boxed{\dfrac{1}{512x^7\sqrt{x}}}$

9) $\left(\dfrac{4w^{1/4}y^{3/2}}{w^{2/3}y}\right)^{-3} = \left(\dfrac{w^{2/3}y}{4w^{1/4}y^{3/2}}\right)^{3}$

$= \dfrac{w^2 y^3}{64w^{3/4}y^{9/2}} = \dfrac{w^{5/4}y^{-3/2}}{64}$

$= \dfrac{\sqrt[4]{w^5}}{64\sqrt{y^3}} = \boxed{\dfrac{4w\cdot\sqrt[4]{w}}{64y\sqrt{y}}}$

11) $\dfrac{7S^{3/4}}{S^{4/3}} = 7S^{9/12 - 16/12} = 7S^{-5/12}$

$= \dfrac{7}{S^{5/12}} = \boxed{\dfrac{7}{\sqrt[12]{S^5}}}$