

1. Evaluate:

$$\left(\frac{2^{-1}}{5^{-2}}\right)^2 = \frac{2^{-2}}{5^{-4}} = \frac{5^4}{2^2} = \frac{625}{4}$$

2. Simplify. Express your solutions using positive exponents only.

(a)  $\frac{a^3 b^{-2}}{a^{-2} b^{-4}} = \frac{a^3 a^2 b^{-2} b^4}{a^1 b^2} = \frac{a^5 b^2}{a b^2}$

(b)  $(3ab^{-1})(4a^{-3}b^3) = 12a^{-2}b^2 = \frac{12b^2}{a^2}$

(c)  $\frac{-84ab^{-5}}{6a^2b^{-7}} = \frac{-14b^{-5}b^7}{a^2} = \frac{-14b^2}{a^2}$

(d)  $\left(\frac{25a^{-1}b^{-5}}{a^{-4}b^{-6}}\right)^{-2} = \left(\frac{25 \times a^{-1-(-4)} \times b^{-5-(-6)}}{1}\right)^{-2} = (25 \times a^3 \times b)^{-2} = \frac{1}{625 \times a^6 \times b^2}$

(e)  $\left(\frac{a^{1/2} b^{1/2}}{a^{3/4} b^2}\right)^4 = \frac{a^{1/2 \times 4} b^{1/2 \times 4}}{a^{3/4 \times 4} b^{2 \times 4}} = \frac{a^2 b^2}{a^3 b^8} = \frac{b^2}{a b^6}$

(f)  $\frac{4x^2 y^2}{9x^3} + \frac{8y^2}{27xy} = \frac{4x^2 y^2}{9x^3} + \frac{27xy \cdot 8y^2}{27xy \cdot 9x^3} = \frac{4x^2 y^2}{9x^3} + \frac{216xy^3}{27x^3 y^3} = \frac{4x^2 y^2}{9x^3} + \frac{8y^3}{x}$

3. Simplify:

(a)  $\frac{2a+1}{3} + \frac{5a-4}{3} = \frac{2a+1+5a-4}{3} = \frac{7a-3}{3}$

(b)  $\frac{(2a-1) \cdot 3 + (3a+2) \cdot 2}{4 \cdot 13} = \frac{6a-3+9a+6}{52} = \frac{15a+3}{52} = \frac{3(5a+1)}{52}$

3c)  $\frac{2n}{(n+5)(n-5)} + \frac{4}{4(n+5)} + \frac{3 \cdot (n-5)}{4(n+5)(n-5)} = \frac{8n+3n-15}{4(n+5)(n-5)}$

$= \frac{11n-15}{4(n+5)(n-5)}$

See below

(b)  $\frac{2a-1}{4} + \frac{3a+2}{6}$  LCD: 12

(c)  $\frac{2n}{n^2-25} + \frac{3}{4n+20} = \frac{2n}{(n+5)(n-5)} + \frac{3}{4(n+5)}$  LCD:  $4(n+5)(n-5)$

(d)  $\frac{1}{2} - 18x$  LCD: 2,  $\frac{1}{2} - 18(x \cdot 2) = \frac{1-36x}{2}$

(e)  $\frac{18a^3}{6a^2} + \frac{b}{6a^2}$  LCD:  $6a^2$ ,  $\frac{18a^3 \cdot b}{6a^2 \cdot b} = \frac{3a \cdot b}{b}$

(f)  $\frac{6}{12} - \frac{5}{6}$  LCD:  $12b^2$ ,  $\frac{6 \cdot a^2 b^2}{12} - \frac{5 \cdot a^2 b^2}{6} = \frac{6a^2 b^2 - 10a^2 b^2}{12b^2} = \frac{-4a^2 b^2}{12b^2} = \frac{-a^2}{3b^2}$

4. Solve these equations. Be sure to check your solution(s).

(a)  $\frac{2}{3x} = \frac{7}{2x} + \frac{3}{5}$  LCD:  $30x$ ,  $\frac{2}{3x} \cdot 30x = \frac{7}{2x} \cdot 30x + \frac{3}{5} \cdot 30x$

(b)  $\frac{2}{3x} + \frac{1}{4} = \frac{11}{6x} - \frac{1}{3}$  LCD:  $12x$ ,  $20 = 105 + 18x$

(c)  $\frac{1}{n-1} + 1 = \frac{1}{n^2-n}$  LCD:  $n^2-n$ ,  $-85 = 18x$

(a)  $\sqrt{180} = \sqrt{36 \cdot 5} = 6\sqrt{5}$

4b)  $x \neq 0$ , LCD:  $12x$ ,  $\frac{2}{3x} \cdot 12x + \frac{1}{4} \cdot 12x = \frac{11}{6x} \cdot 12x - \frac{1}{3} \cdot 12x$

$8 + 3x = 22 - 4x$

$7x = 14$

$x = 2$

4c)  $\frac{1}{n-1} + 1 = \frac{1}{n(n-1)}$  LCD:  $n(n-1)$ ,  $n^2 = 1$ , we reject  $n=1$ ,  $n^2 = 1 \implies n = -1$ ,  $\text{ANS: } n = -1$

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$$(b) \sqrt{63x^2y^8} = \sqrt{9x^2y^8} \sqrt{7} = \boxed{3xy^4\sqrt{7}}$$

$$(c) \sqrt[4]{32a^4b^4} = \sqrt[4]{16a^4b^4} \sqrt[4]{2^3b^3} = \boxed{2ab^4\sqrt[4]{2^3b^3}}$$

$$(d) \sqrt{\frac{4b}{100a^3}} = \sqrt{\frac{1}{25a^3}} = \boxed{\frac{1}{5a^3}}$$

$$(e) \sqrt[3]{p^3q^3} = \sqrt[3]{99} \sqrt[3]{p^2q} = \boxed{pq^3\sqrt[3]{pq}}$$

6. Write in radical form.

$$(a) 3x^{1/3} = \boxed{3\sqrt[3]{x}}$$

$$(b) 4(ab)^{3/2} = \boxed{4\sqrt{a^3b^3}}$$

7. Add or subtract the radical expressions as indicated.

$$(a) -3\sqrt{4x} + 2\sqrt{16x} + 6\sqrt{9x} = -3\cdot 2\sqrt{x} + 2\cdot 4\sqrt{x} + 6\cdot 3\sqrt{x} = -6\sqrt{x} + 8\sqrt{x} + 18\sqrt{x} = \boxed{20\sqrt{x}}$$

$$(b) \sqrt{12t} - \sqrt{27t} + 5\sqrt{3t} = 2\sqrt{3t} - 3\sqrt{3t} + 5\sqrt{3t} = \boxed{4\sqrt{3t}}$$

$$(c) 4\sqrt{50} - 3\sqrt{125w^2} = 4w\sqrt{5} - 3\cdot 5w\sqrt{5} = 4w\sqrt{5} - 15w\sqrt{5} = \boxed{-11w\sqrt{5}}$$