

Objective 36-37

Add and subtract numerical and radical expressions

PROBLEM

Simplify (assume the variables represent positive values):

$$-x^9\sqrt{36y^3} - y\sqrt{121x^{18}y}$$

STEP 1

Factor the expressions under the radical symbol using perfect square factors where possible and apply the product property of square roots.

$$\begin{aligned} -x^9\sqrt{36y^3} - y\sqrt{121x^{18}y} &= -x^9\sqrt{36y^2y} - y\sqrt{121x^{18}y} \\ &= -x^9\sqrt{36y^2} \cdot \sqrt{y} - y\sqrt{121x^{18}} \cdot \sqrt{y} \end{aligned}$$

STEP 2

Extract the square roots of the perfect squares.

$$\begin{aligned} -x^9\sqrt{36y^2} \cdot \sqrt{y} - y\sqrt{121x^{18}} \cdot \sqrt{y} &= -x^9\sqrt{6^2y^2} \cdot \sqrt{y} - y\sqrt{11^2(x^9)^2} \cdot \sqrt{y} \\ &= -x^9 \cdot 6y \cdot \sqrt{y} - y \cdot 11x^9 \cdot \sqrt{y} \\ &= -6x^9y\sqrt{y} - 11x^9y\sqrt{y} \end{aligned}$$

STEP 3

Combine like terms.

$$\begin{aligned} -6x^9y\sqrt{y} - 11x^9y\sqrt{y} &= (-6x^9y - 11x^9y)\sqrt{y} \\ &= -17x^9y\sqrt{y} \end{aligned}$$

ANSWER

$$-17x^9y\sqrt{y}$$

Guided Practice:

1. $\sqrt{48x^{12}} + 4x^6\sqrt{3}$ [A] $8x^6\sqrt{3}$ [B] $20\sqrt{6x^{12}}$ [C] $8x^6\sqrt{6}$ [D] $20\sqrt{3x^{12}}$

2. $-5\sqrt{8x^{12}} - x^6\sqrt{2}$

3. $5\sqrt{3m} - \sqrt{12m}$ [A] $3\sqrt{3m}$ [B] $3\sqrt{6m}$ [C] $21\sqrt{3m}$ [D] $21\sqrt{6m}$

4. $12\sqrt{75q} - 3\sqrt{3q}$

1. $-4\sqrt{6} - 2\sqrt{6}$ [A] $-6\sqrt{6}$ [B] $16\sqrt{3}$ [C] $6\sqrt{6}$ [D] $-16\sqrt{3}$
2. $6\sqrt{5} + 8\sqrt{5}$
3. $7\sqrt{2} + 2\sqrt{8} + 2\sqrt{98}$ [A] $11\sqrt{2}$ [B] $17\sqrt{2}$ [C] $25\sqrt{2}$ [D] $18\sqrt{2}$
4. $4\sqrt{3} + 7\sqrt{29} + 2\sqrt{75}$

Practice: Simplify

47. $9\sqrt{6} + \sqrt{6}$ [A] $18\sqrt{3}$ [B] $9\sqrt{6}$ [C] $20\sqrt{3}$ [D] $10\sqrt{6}$
48. $2\sqrt{5} + 8\sqrt{10} + 2\sqrt{45}$
[A] $8\sqrt{5} + 8\sqrt{10}$ [B] $4\sqrt{5} - 8\sqrt{10}$ [C] $8\sqrt{5} - 8\sqrt{10}$ [D] $4\sqrt{5} + 8\sqrt{10}$
49. $8\sqrt{3} + 5\sqrt{27}$ [A] $13\sqrt{3}$ [B] $23\sqrt{3}$ [C] $53\sqrt{3}$ [D] $39\sqrt{3}$
50. $-8\sqrt{3} + \sqrt{3}$ [A] $-7\sqrt{3}$ [B] $-7\sqrt{6}$ [C] $-9\sqrt{3}$ [D] $-9\sqrt{6}$
51. $-7\sqrt{8} + 4\sqrt{2}$ [A] $-24\sqrt{2}$ [B] $-3\sqrt{2}$ [C] $-6\sqrt{2}$ [D] $-10\sqrt{2}$
52. $-8x^4\sqrt{5} - \sqrt{80x^8}$
[A] $-24\sqrt{10x^8}$ [B] $-12x^4\sqrt{10}$ [C] $-12x^4\sqrt{5}$ [D] $-24\sqrt{5x^8}$
53. $-2\sqrt{2x} + 5\sqrt{32x}$ [A] $76\sqrt{4x}$ [B] $18\sqrt{2x}$ [C] $18\sqrt{4x}$ [D] $76\sqrt{2x}$
54. $-\sqrt{49x} - 10\sqrt{64x}$ [A] $-87\sqrt{2x}$ [B] $-73\sqrt{2x}$ [C] $-73\sqrt{x}$ [D] $-87\sqrt{x}$
55. $-\sqrt{10x} - \sqrt{40x}$
[A] $-3\sqrt{10x}$ [B] $-5\sqrt{10x}$ [C] $-5\sqrt{20x}$ [D] $-3\sqrt{20x}$