

# Operations with Radical Expressions Assignment

Add, subtract and simplify the following expressions. Assume that all variables represent positive real numbers.

1.  $2\sqrt{3} + 3\sqrt{3} - 10\sqrt{3} =$

2.  $3\sqrt{6} + \sqrt{24} =$

3.  $3\sqrt{2} + \sqrt{50} - 5\sqrt{8} =$

4.  $\sqrt{300} - \sqrt{27} - \sqrt{75} =$

5.  $\sqrt[5]{x^6} + 6\sqrt[5]{32x^6} - \sqrt[5]{243x^{11}} =$

6.  $\sqrt{(2+y)} + 6\sqrt{(2+y)} - (2+y)^{\frac{1}{2}} =$

Multiply and simplify the following expressions. Assume that all variables represent positive real numbers.

7.  $\sqrt{3}(\sqrt{5} - \sqrt{3}) =$

8.  $\sqrt{6a^3b^2}(\sqrt{6ab^2} - \sqrt{4ab}) =$

9.  $(\sqrt{5} + \sqrt{2})(\sqrt{2} - \sqrt{5}) =$

10.  $(x + 3\sqrt{x})(2\sqrt{x} - x) =$

11.  $(\sqrt{5} - \sqrt{3})^2 =$

12.  $(\sqrt{x} - \sqrt{2x})^2 =$

# Operations with Radical Expressions Assignment

Simplify the following expressions. Assume that all variables represent positive real numbers.

13.  $\sqrt{3} * \sqrt[3]{2} =$

14.  $\sqrt[4]{y} * \sqrt{x+1} =$

Simplify the following expressions (rationalize the denominator). Assume that all variables represent positive real numbers.

15.  $\frac{3}{\sqrt{7}} =$

16.  $\frac{16}{\sqrt[4]{4}} =$

17.  $\frac{2}{2 - \sqrt{3}} =$

18.  $\frac{1 - x}{1 - \sqrt{x}} =$

# Operations with Radical Expressions Assignment

## ANSWERS

Add, subtract and simplify the following expressions. Assume that all variables represent positive real numbers.

1.  $2\sqrt{3} + 3\sqrt{3} - 10\sqrt{3} = -5\sqrt{3}$

2.  $3\sqrt{6} + \sqrt{24} =$   
 $= 3\sqrt{6} + \sqrt{2^2 * 6} =$   
 $= 3\sqrt{6} + 2\sqrt{6} =$   
 $= 5\sqrt{6}$

3.  $3\sqrt{2} + \sqrt{50} - 5\sqrt{8} =$   
 $= 3\sqrt{2} + \sqrt{2 * 5^2} - 5\sqrt{2 * 2^2} =$   
 $= 3\sqrt{2} + 5\sqrt{2} - 10\sqrt{2} =$   
 $= -2\sqrt{2}$

4.  $\sqrt{300} - \sqrt{27} - \sqrt{75} =$   
 $= \sqrt{3 * 10^2} - \sqrt{3 * 3^2} - \sqrt{3 * 5^2} =$   
 $= 10\sqrt{3} - 3\sqrt{3} - 5\sqrt{3} =$   
 $= 2\sqrt{3}$

5.  $\sqrt[5]{x^6} + 6\sqrt[5]{32x^6} - \sqrt[5]{243x^{11}} =$   
 $= \sqrt[5]{x * x^5} + 6\sqrt[5]{2^5 x * x^5} - \sqrt[5]{3^5 * x * (x^2)^5} =$   
 $= x\sqrt[5]{x} + 12x\sqrt[5]{x} - 3x^2\sqrt[5]{x} =$   
 $= 13x\sqrt[5]{x} - 3x^2\sqrt[5]{x}$

6.  $\sqrt{(2+y)} + 6\sqrt{(2+y)} - (2+y)^{\frac{1}{2}} =$   
 $= \sqrt{(2+y)} + 6\sqrt{(2+y)} - \sqrt{(2+y)} =$   
 $= 6\sqrt{(2+y)}$

Multiply and simplify the following expressions. Assume that all variables represent positive real numbers.

7.  $\sqrt{3}(\sqrt{5} - \sqrt{3}) =$   
 $= \sqrt{3} * \sqrt{5} - \sqrt{3} * \sqrt{3} =$   
 $= \sqrt{15} - 3$

8.  $\sqrt{6a^3b^2}(\sqrt{6ab^2} - \sqrt{4ab}) =$   
 $= \sqrt{6 * 6a^4b^4} - \sqrt{6 * 4a^4b^3} =$   
 $= \sqrt{36a^4b^4} - \sqrt{24a^4b^3} =$   
 $= 6a^2b^2 - 2a^2b\sqrt{6b}$

9.  $(\sqrt{5} + \sqrt{2})(\sqrt{2} - \sqrt{5}) =$   
 $= \sqrt{5} * \sqrt{2} - \sqrt{5} * \sqrt{5} + \sqrt{2} * \sqrt{2} - \sqrt{2} * \sqrt{5} =$   
 $= \sqrt{10} - 5 + 2 - \sqrt{10} =$   
 $= -3$

10.  $(x + 3\sqrt{x})(2\sqrt{x} - x) =$   
 $= 2x * \sqrt{x} - x * x + 3\sqrt{x} * 2\sqrt{x} - 3\sqrt{x} * x =$   
 $= 2x\sqrt{x} - x^2 + 6\sqrt{x * x} - 3x\sqrt{x * x} =$   
 $= 2x\sqrt{x} - x^2 + 6\sqrt{x} * x - 3x\sqrt{x * x} =$   
 $= 2x\sqrt{x} - x^2 + 6x - 3x^2 =$   
 $= 2x\sqrt{x} - 4x^2 + 6x$

11.  $(\sqrt{5} - \sqrt{3})^2 =$   
 $= (\sqrt{5} - \sqrt{3}) * (\sqrt{5} - \sqrt{3}) =$   
 $= \sqrt{5} * \sqrt{5} - \sqrt{5} * \sqrt{3} - \sqrt{3} * \sqrt{5} + \sqrt{3} * \sqrt{3} =$   
 $= 5 - \sqrt{15} - \sqrt{15} + 3 =$   
 $= 8 - 2\sqrt{15}$

12.  $(\sqrt{x} - \sqrt{2x})^2 =$   
 $= (\sqrt{x} - \sqrt{2x}) * (\sqrt{x} - \sqrt{2x}) =$   
 $= \sqrt{x} * \sqrt{x} - \sqrt{x} * \sqrt{2x} - \sqrt{2x} * \sqrt{x} + \sqrt{2x} * \sqrt{2x} =$   
 $= x - x\sqrt{2} - x\sqrt{2} + 2x =$   
 $= 3x - 2x\sqrt{2}$

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Simplify the following expressions. Assume that all variables represent positive real numbers.

$$13. \quad \sqrt{3} * \sqrt[3]{2} = 3^{\frac{1}{2}} * 2^{\frac{1}{3}} = 3^{\frac{1*3}{2*3}} * 2^{\frac{1*2}{3*2}} = 3^{\frac{3}{6}} * 2^{\frac{2}{6}} = \sqrt[6]{3^3} * \sqrt[6]{2^2} = \sqrt[6]{3^3 * 2^2} = \sqrt[6]{36}$$

$$14. \quad \sqrt[4]{y} * \sqrt{x+1} = y^{\frac{1}{4}} * (x+1)^{\frac{1}{2}} = y^{\frac{1}{4}} * (x+1)^{\frac{1*2}{2*2}} = y^{\frac{1}{4}} * (x+1)^{\frac{2}{4}} = \sqrt[4]{y} * \sqrt[4]{(x+1)^2} = \sqrt[4]{y(x+1)^2}$$

Simplify the following expressions (rationalize the denominator). Assume that all variables represent positive real numbers.

$$15. \quad \frac{3}{\sqrt{7}} = \frac{3}{\sqrt{7}} * \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$$

$$16. \quad \frac{16}{\sqrt[4]{4}} = \frac{16}{\sqrt[4]{4}} * \frac{\sqrt[4]{4^3}}{\sqrt[4]{4^3}} = \frac{16\sqrt[4]{4^3}}{4} = 4\sqrt[4]{64} = 8\sqrt[4]{4}$$

$$17. \quad \frac{2}{2-\sqrt{3}} = \frac{2}{2-\sqrt{3}} * \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{2(2+\sqrt{3})}{2^2 - (\sqrt{3})^2} = \frac{2(2+\sqrt{3})}{4-3} = 4 + 3\sqrt{3}$$

$$18. \quad \frac{1-x}{1-\sqrt{x}} = \frac{1-x}{1-\sqrt{x}} * \frac{1+\sqrt{x}}{1+\sqrt{x}} = \frac{(1-x)(1+\sqrt{x})}{1^2 - (\sqrt{x})^2} = \frac{(1-x)(1+\sqrt{x})}{1-x} = 1 + \sqrt{x}$$