# POWERS AND ROOTS

## 47. MULTIPLYING AND DIVIDING POWERS

To multiply powers with the same base, **add the exponents:** $x^3 \times x^4 = x^{3+4} = x^7$. To divide powers with the same base, **subtract the exponents:** $y^{13} \div y^8 = y^{13-8} = y^5$.

## 48. RAISING POWERS TO POWERS

To raise a power to an exponent, **multiply the exponents.** $(x^3)^4 = x^{3 \times 4} = x^{12}$.

## 49. SIMPLIFYING SQUARE ROOTS

To simplify a square root, **factor out the perfect squares** under the radical, unsquare them and put the result in front. $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$.

## 50. ADDING AND SUBTRACTING ROOTS

You can add or subtract radical expressions only if the part under the radicals is the same.

$$2\sqrt{3} + 3\sqrt{3} = 5\sqrt{3}$$

## 51. MULTIPLYING AND DIVIDING ROOTS

The product of square roots is equal to the square root of the product:

$\sqrt{3} \times \sqrt{5} = \sqrt{3 \times 5} = \sqrt{15}$. The quotient of square roots is equal to the **square root of the quotient:**

$$\frac{\sqrt{6}}{\sqrt{3}} = \frac{\sqrt{6}}{3} = \sqrt{2}.$$