# Simplifying Radicals

Warm-Up! Simplify:

① $\sqrt{99}$

$\sqrt{9 \cdot 11}$

$\boxed{3\sqrt{11}}$

② $\sqrt{128}$

$\sqrt{64 \cdot 2}$

$\boxed{8\sqrt{2}}$

③ $\sqrt{5} \cdot \sqrt{5}$

$\sqrt{25}$

$\boxed{5}$

④ $\sqrt{20} \cdot \sqrt{5}$

$\sqrt{100}$

$\boxed{10}$

Take it up a notch! Simplify with variables:

a) $\sqrt{9x^2}$

$\boxed{3x}$

b) $\sqrt{25x^4}$

$\boxed{5x^2}$

c) $\sqrt{32x^6}$

$\sqrt{16 \cdot 2 \cdot x^6}$

$\boxed{4x^3\sqrt{2}}$

d) $\sqrt{9x^3}$

$\sqrt{9 \cdot x^2 \cdot x}$

$\boxed{3x\sqrt{x}}$

e) $\sqrt{25x^5}$

$\sqrt{25 \cdot x^4 \cdot x}$

$\boxed{5x^2\sqrt{x}}$

f) $\sqrt{32x^9}$

$\sqrt{16 \cdot 2 \cdot x^8 \cdot x}$

$\boxed{4x^4\sqrt{2x}}$

g) $\sqrt{x^2 y}$

$\boxed{x\sqrt{y}}$

h) $\sqrt{5x^3 y}$

$\sqrt{5 \cdot x^2 \cdot x \cdot y}$

$\boxed{x\sqrt{5xy}}$

i) $\sqrt{72x^3 y^5}$

$\sqrt{36 \cdot 2 \cdot x^2 \cdot x \cdot y^4 \cdot y}$

$\boxed{6xy^2 \sqrt{2xy}}$

# Multiplying Radicals with Variables

a) $\sqrt{3x} \cdot \sqrt{3x}$

$\sqrt{9x^2}$

$\boxed{3x}$

b) $\sqrt{4x} \cdot \sqrt{x^3}$

$\sqrt{4x^4}$

$\boxed{2x^2}$

c) $\sqrt{3x} \cdot 4\sqrt{x}$

$4\sqrt{3x^2}$

$\boxed{4x\sqrt{3}}$

d) $\sqrt{7xy^2} \cdot 3\sqrt{x}$

$3\sqrt{7x^2 y^2}$

$\boxed{3xy\sqrt{7}}$

e) $3\sqrt{b} \cdot \sqrt{2b^3}$

$3\sqrt{2b^4}$

$\boxed{3b^2\sqrt{2}}$

f) $2\sqrt{mn^2} \cdot \sqrt{5m^2}$

$2\sqrt{5m^3 n^2}$

$2\sqrt{5 \cdot m^2 \cdot m \cdot n^2}$

$\boxed{2mn\sqrt{5m}}$