Multiplying Powers with the Same Base

$$a^m \cdot a^n = a^{m+n}$$

What is each expression written using each base once?

① $12^3 \cdot 12^5 = (12 \cdot 12 \cdot 12) \cdot (12 \cdot 12 \cdot 12 \cdot 12 \cdot 12) = 12^{3+5} = \boxed{12^8}$

② $(7)^{-3}(7)^9 = \frac{7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7}{7 \cdot 7 \cdot 7} = 7^{9-3} = \boxed{7^6}$

What is the simplified form of each expression?

③ $4y^5 \cdot 9y^{-12} = (4 \cdot 9)(y^{5-12})$

$= 36y^{-7}$

$= \boxed{\frac{36}{y^7}}$

④ $2a \cdot 9b^4 \cdot 3a^2 = (2 \cdot 9 \cdot 3)(a \cdot a^2)(b^4)$

$= \boxed{54a^3b^4}$

Multiplying with Scientific Notation

⑤ $(1.13 \times 10^{-7})(9.98 \times 10^5)(3.34 \times 10^{22})$

$(1.13 \times 9.98 \times 3.34)(10^{-7} \cdot 10^5 \cdot 10^{22})$

$\approx 37.7 \times 10^{20} = \boxed{3.77 \times 10^{21}}$