10.2 Product of Powers Property p.418

① Product of Powers: To multiply powers w/ the same base, add their exponents

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

a) $4^2 \cdot 4^3 = 4^{2+3} = 4^5$

b) $-5 \cdot (-5)^6 = (-5)^7$

c) $x^3 \cdot x^7 = x^{10}$

② Power of a Power Property: to find a power of a power, multiply the exponents

$$(a^m)^n = a^{mn}$$

a) $(3^4)^3 = 3^{4 \cdot 3} = 3^{12}$

b) $(w^5)^4 = w^{20}$

c) $(5^2)^3 = 5^6$

③ Power of a Product Property: to find a power of a product, find the power of each factor and multiply $(ab)^m = a^m b^m$

a) $(2x)^3 = 2^3 \cdot x^3 = 8x^3$

b) $(3xy)^2 = 9x^2y^2$

c) $(4a)^2 = 16a^2$

Simplify each expression:

1.) $6^2 \cdot 6^4 = 6^6$

2) $\left(-\frac{1}{2}\right)^3 \cdot \left(-\frac{1}{2}\right)^6 = \left(-\frac{1}{2}\right)^9$

3) $z \cdot z^{12} = z^{13}$

4) $(4^4)^3 = 4^{12}$

5) $(y^2)^4 = y^8$

6) $\left((-4)^3\right)^2 = (-4)^6$

7) $(5y)^4 = 625y^4$

8) $(ab)^5 = a^5b^5$

9) $(0.5mn)^2 = 0.25m^2n^2$